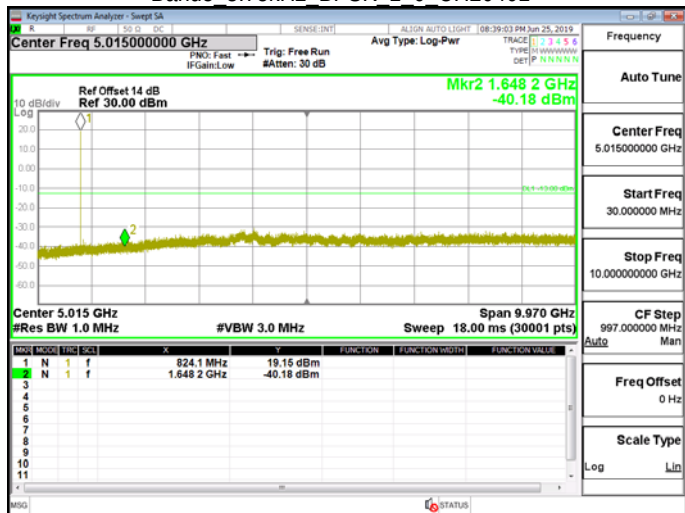
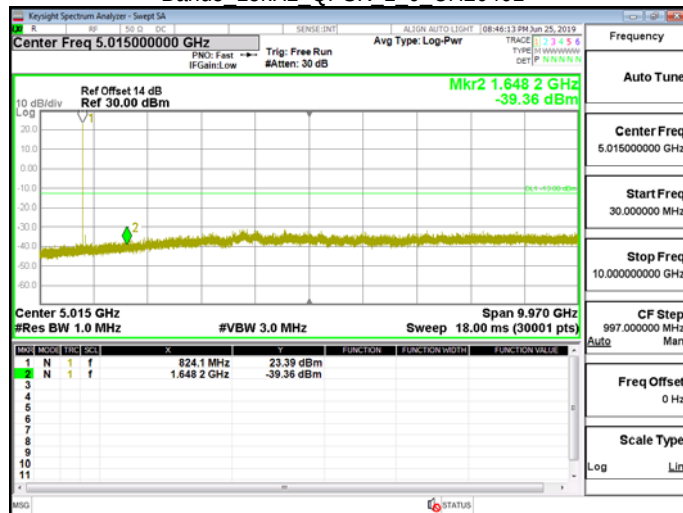


Band5 3.75kHz BPSK 1 0 CH20401



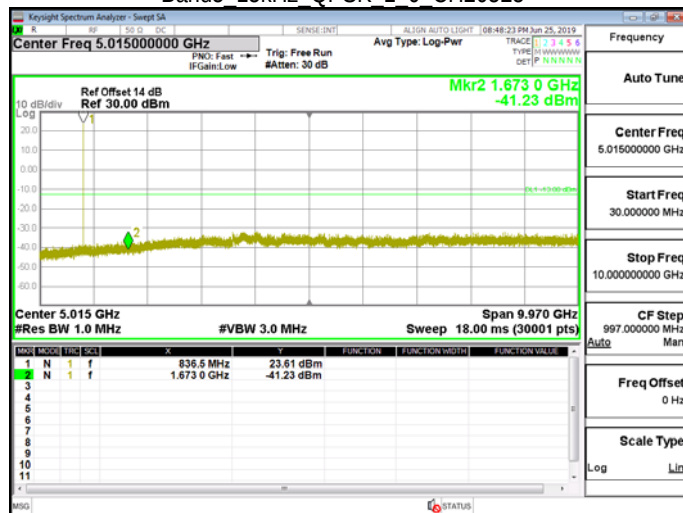
Band5 15kHz QPSK 1 0 CH20401



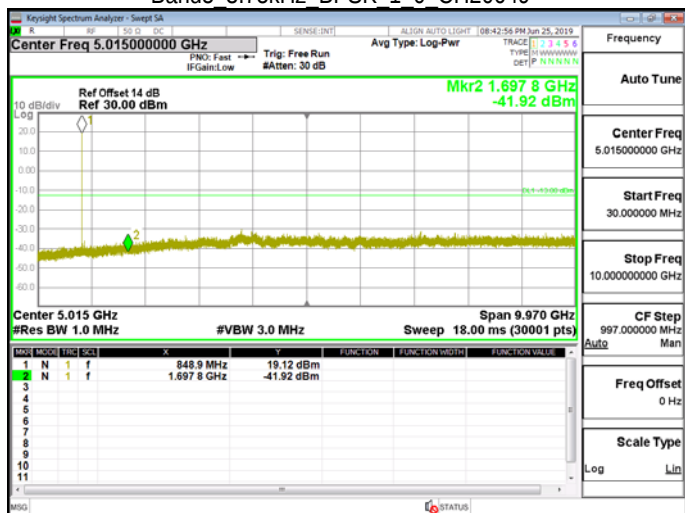
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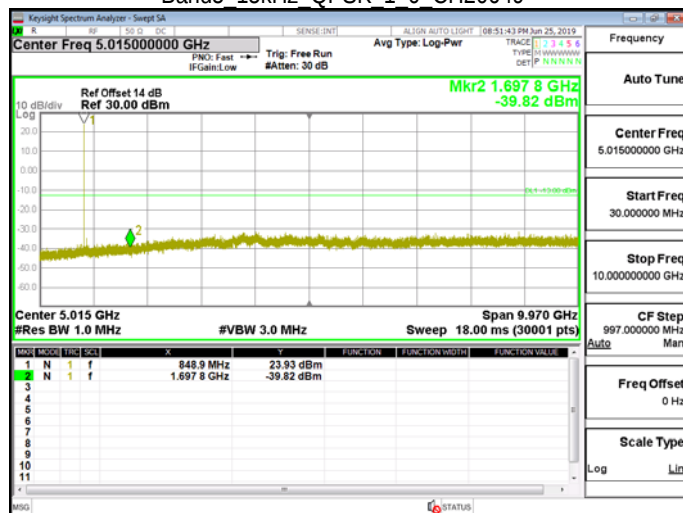
Band5 15kHz QPSK 1 0 CH20525



Band5 3.75kHz BPSK 1 0 CH20649



Band5 15kHz QPSK 1 0 CH20649

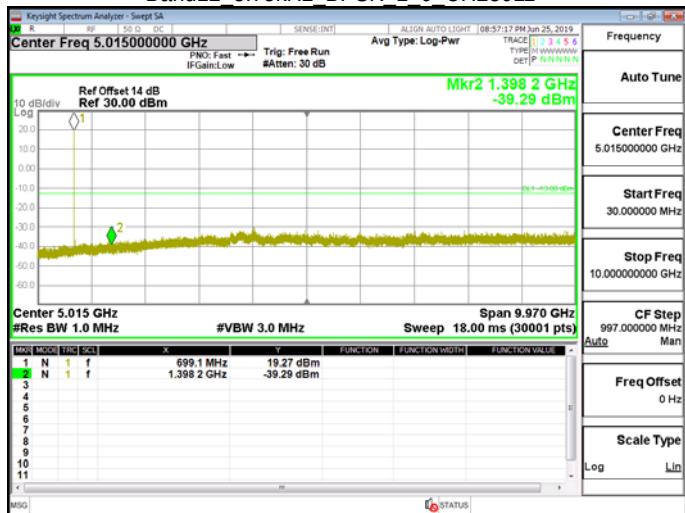


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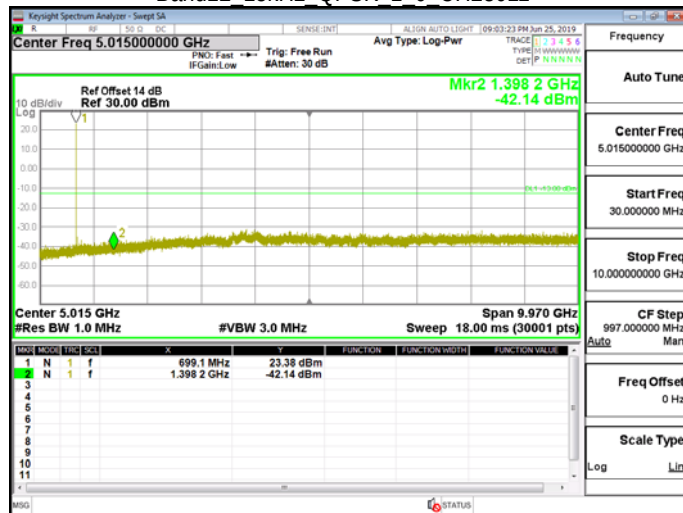
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Band12 3.75kHz BPSK 1 0 CH23011



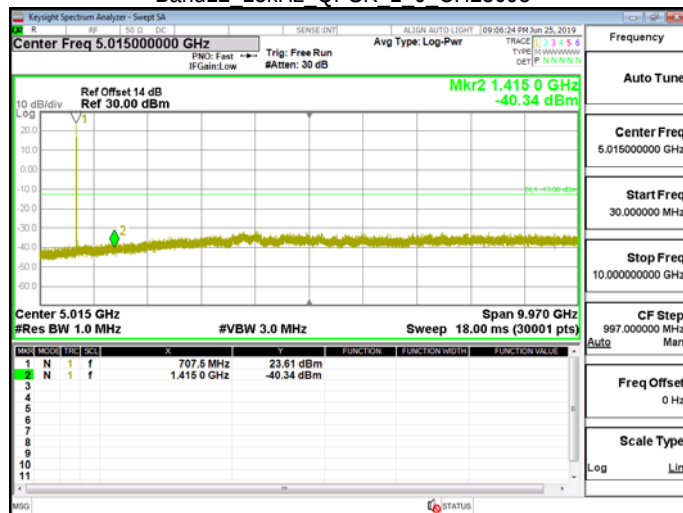
Band12 15kHz QPSK 1 0 CH23011



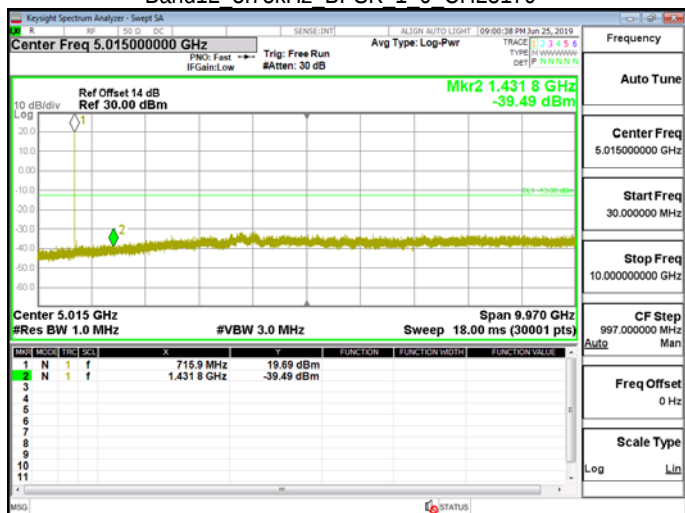
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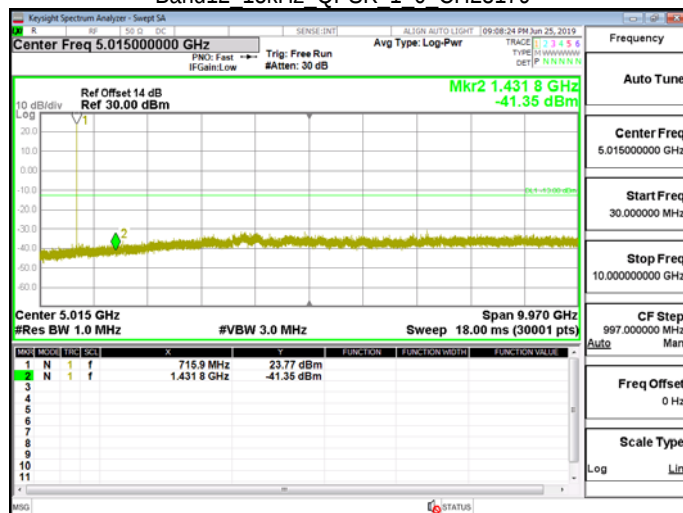
Band12 15kHz QPSK 1 0 CH23095



Band12 3.75kHz BPSK 1 0 CH23179



Band12 15kHz QPSK 1 0 CH23179

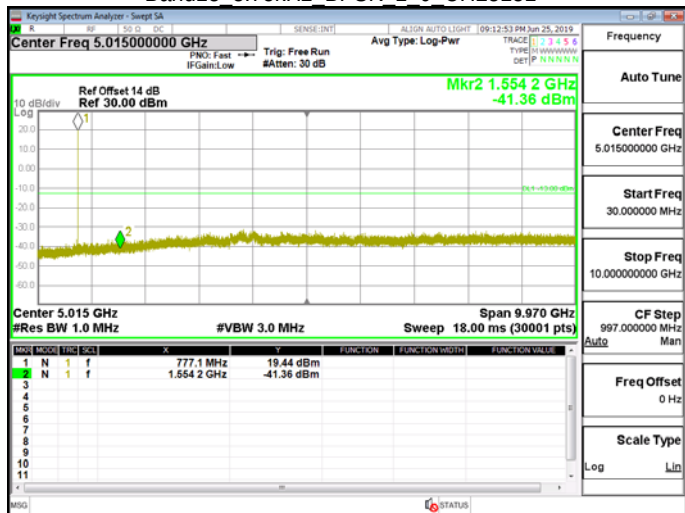


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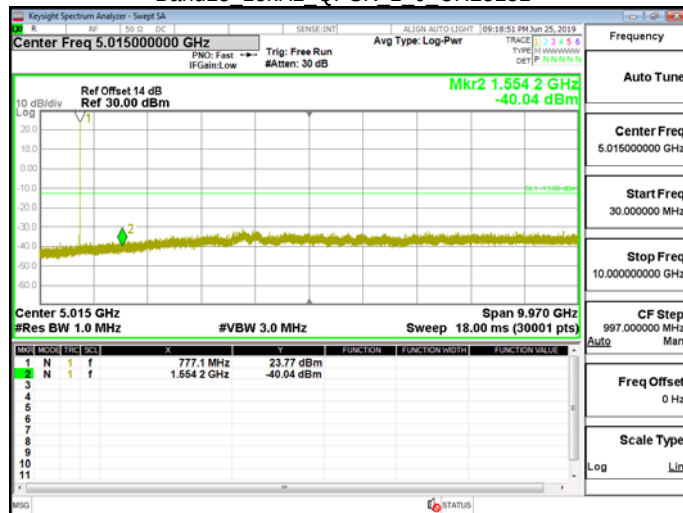
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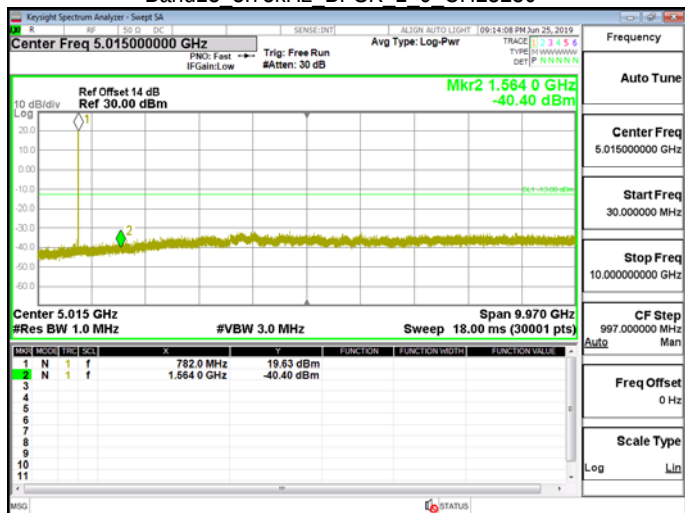
Band13 3.75kHz BPSK 1 0 CH23181



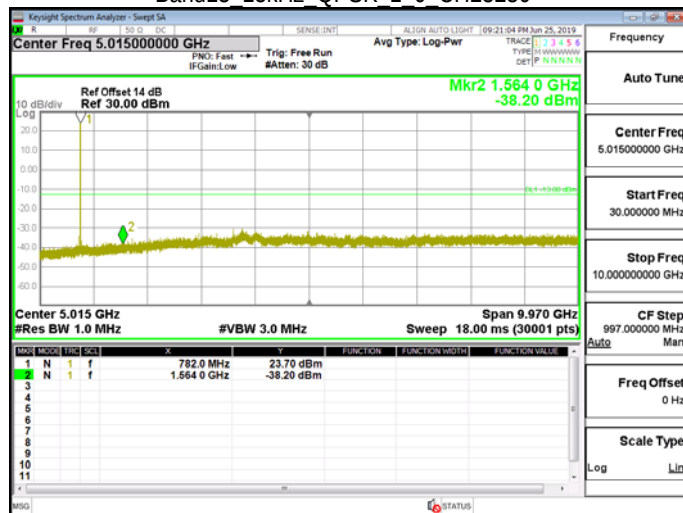
Band13 15kHz QPSK 1 0 CH23181



Band13 3.75kHz BPSK 1 0 CH23230



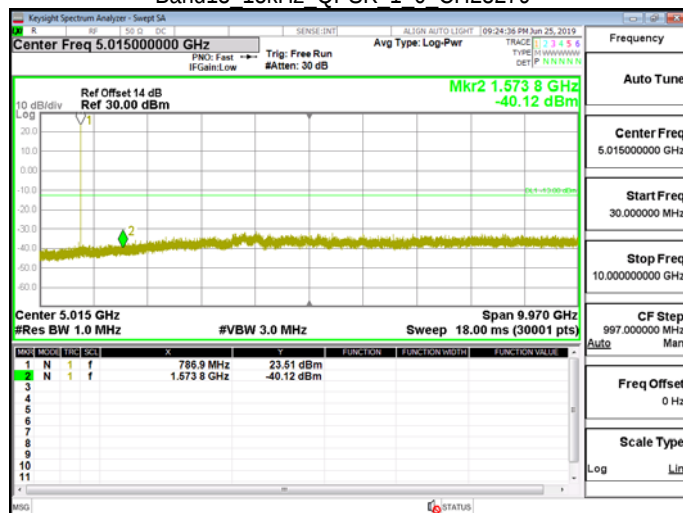
Band13 15kHz QPSK 1 0 CH23230



Band13 3.75kHz BPSK 1 0 CH23279



Band13 15kHz QPSK 1 0 CH23279

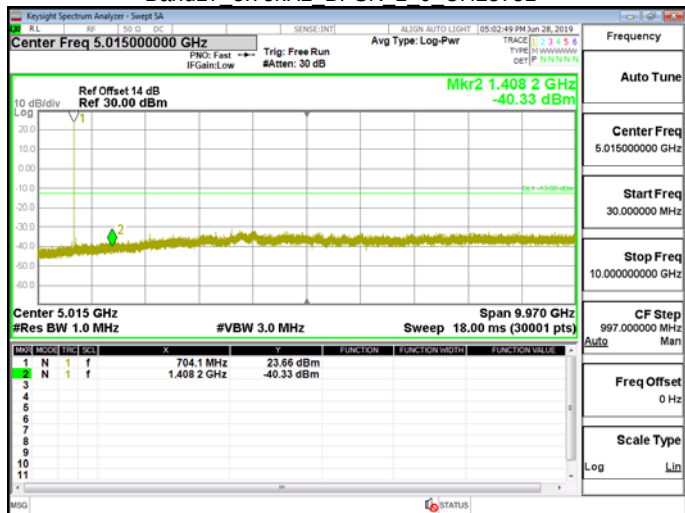


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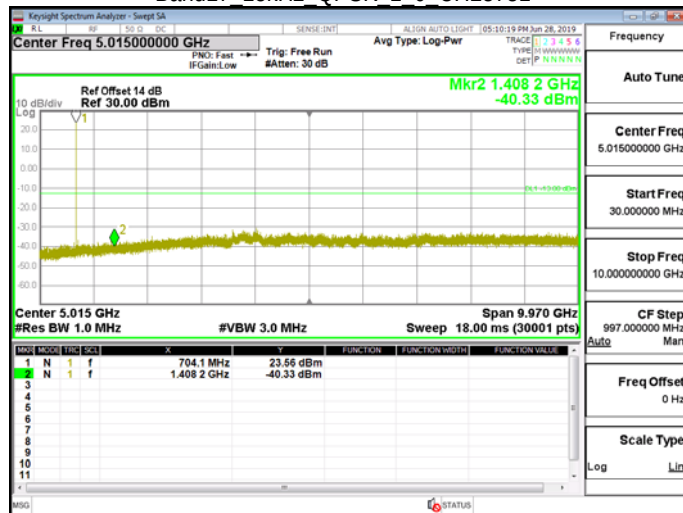
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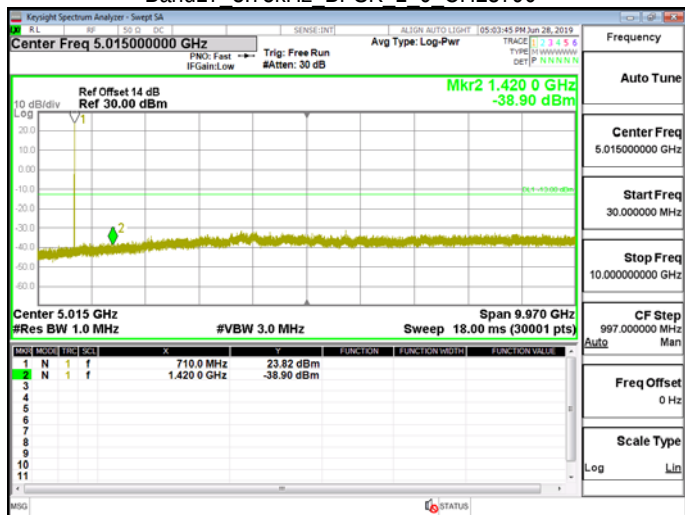
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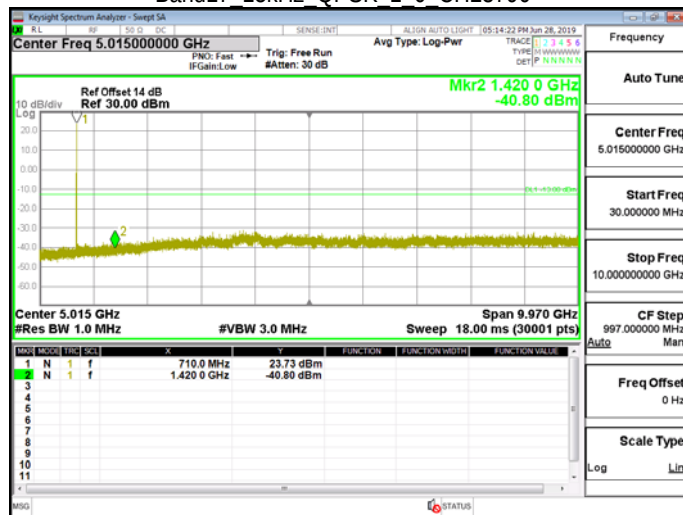
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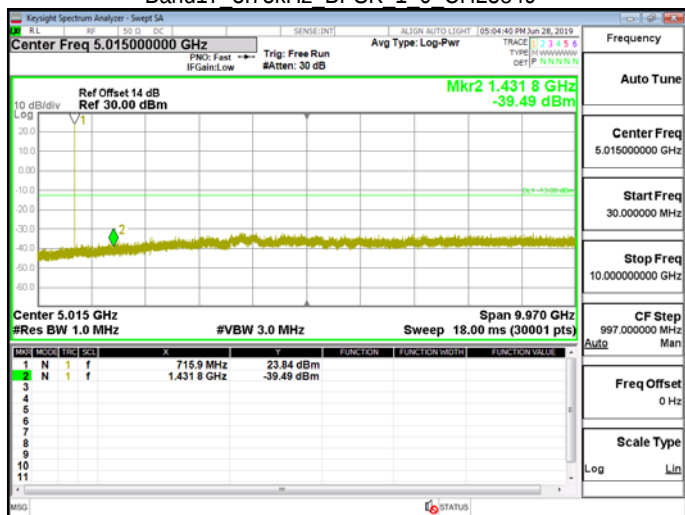
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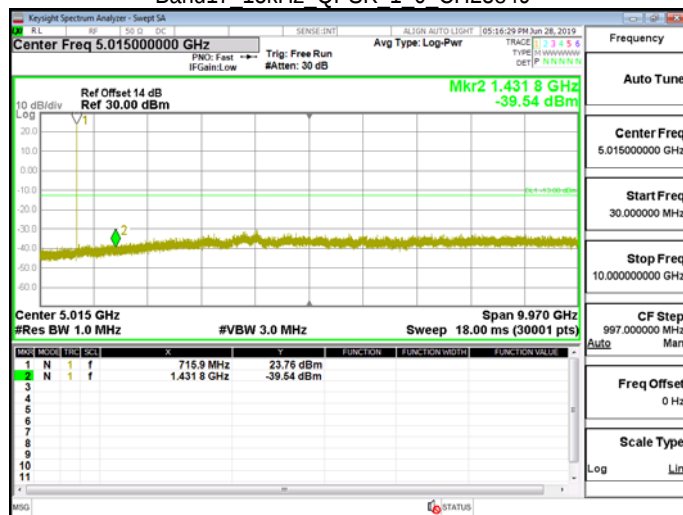
Band17 15kHz QPSK 1 0 CH23790



Band17 3.75kHz BPSK 1 0 CH23849



Band17 15kHz QPSK 1 0 CH23849

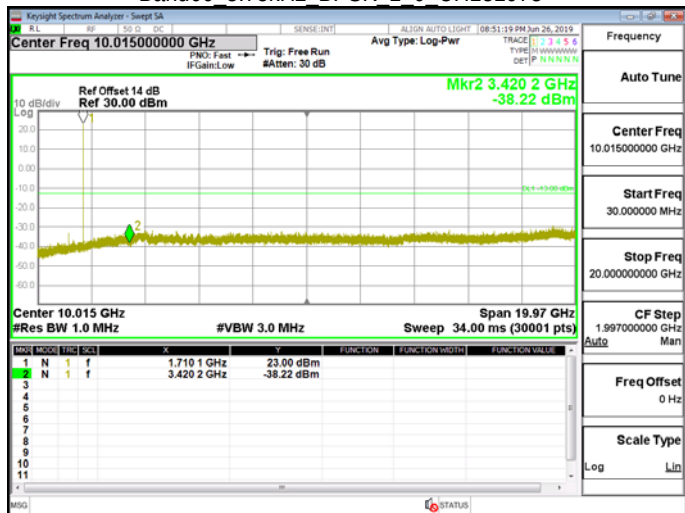


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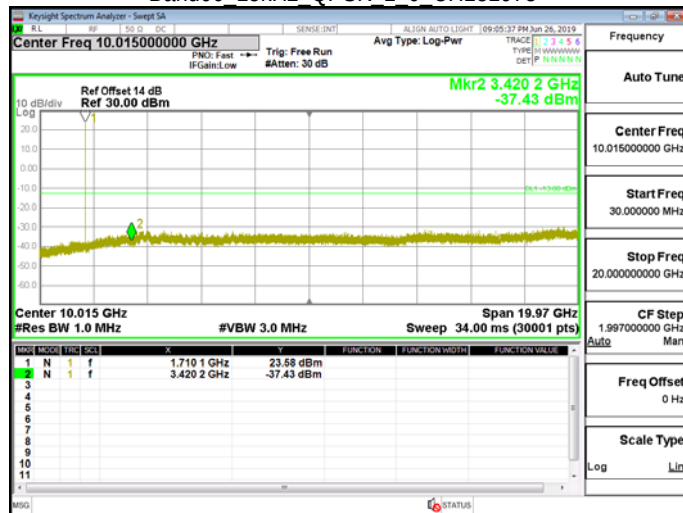
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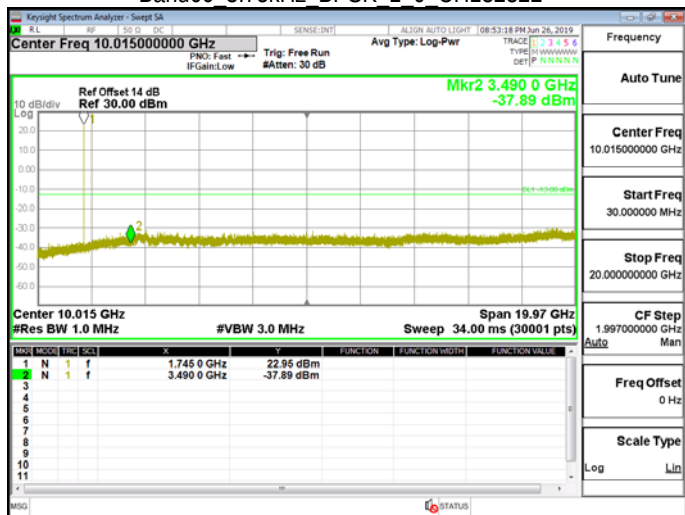
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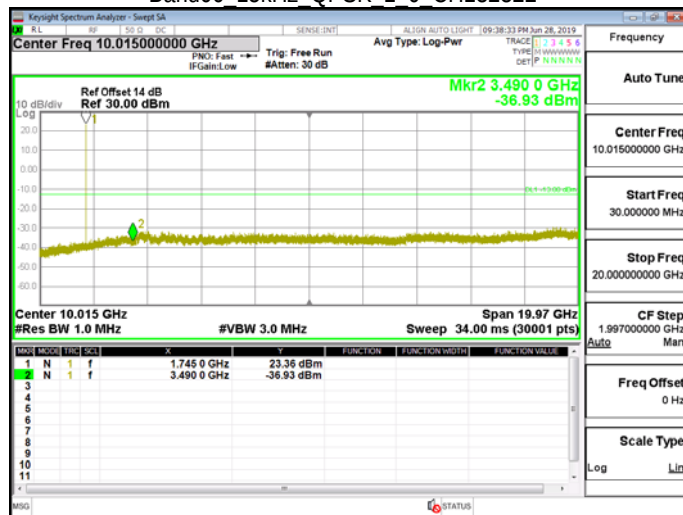
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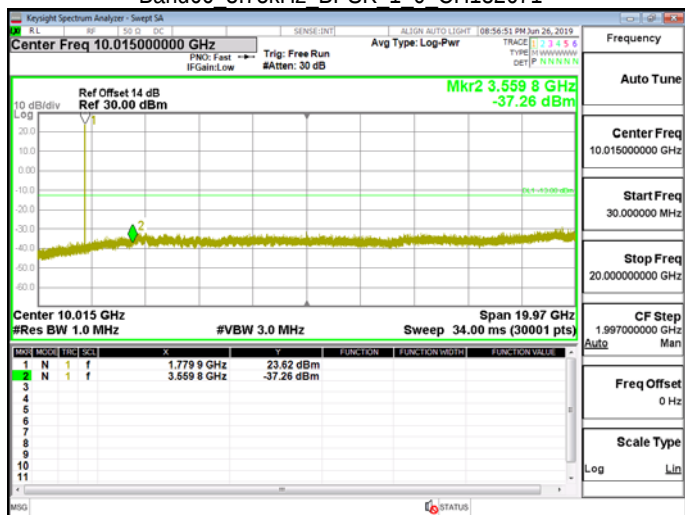
Band66 3.75kHz BPSK 1 0 CH132322



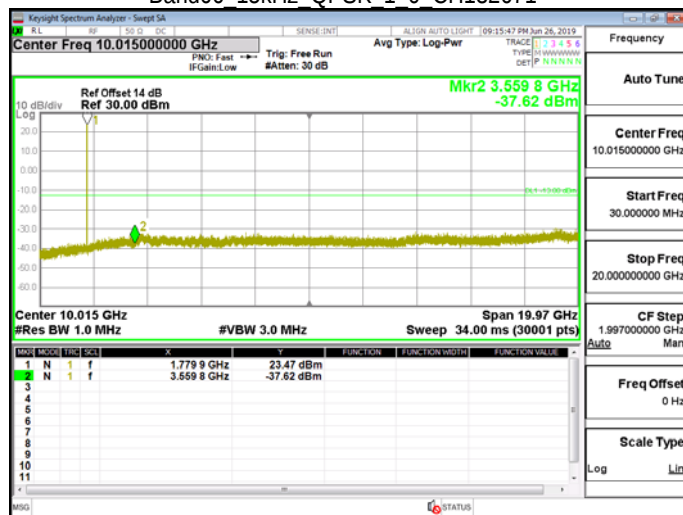
Band66 15kHz QPSK 1 0 CH132322



Band66 3.75kHz BPSK 1 0 CH132671



Band66 15kHz QPSK 1 0 CH132671

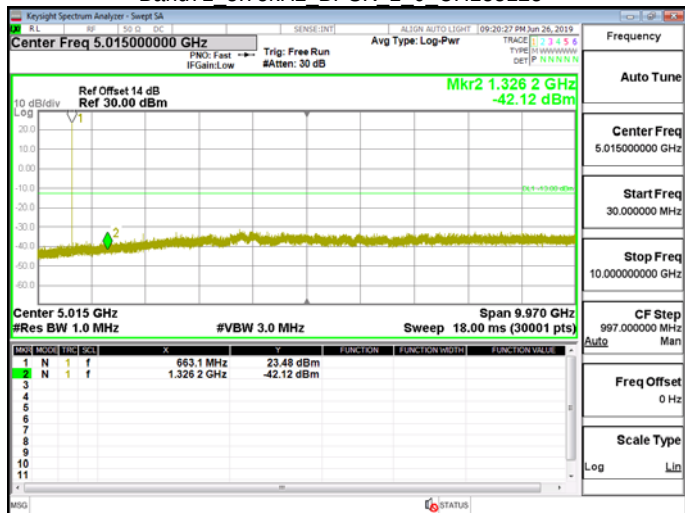


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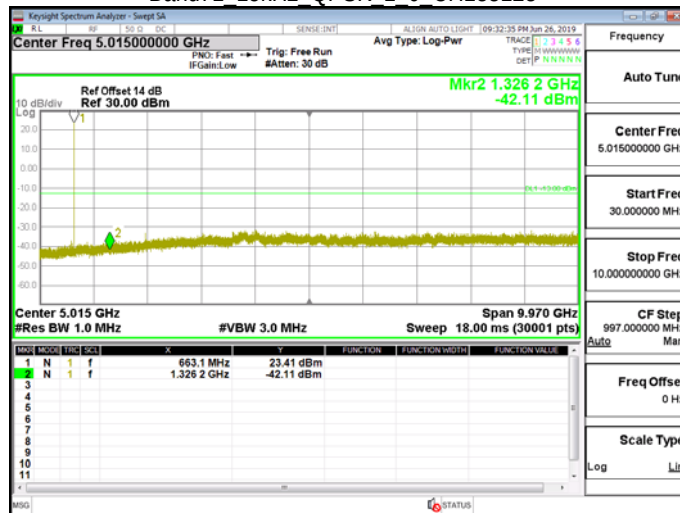
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Band71 3.75kHz BPSK 1 0 CH133123



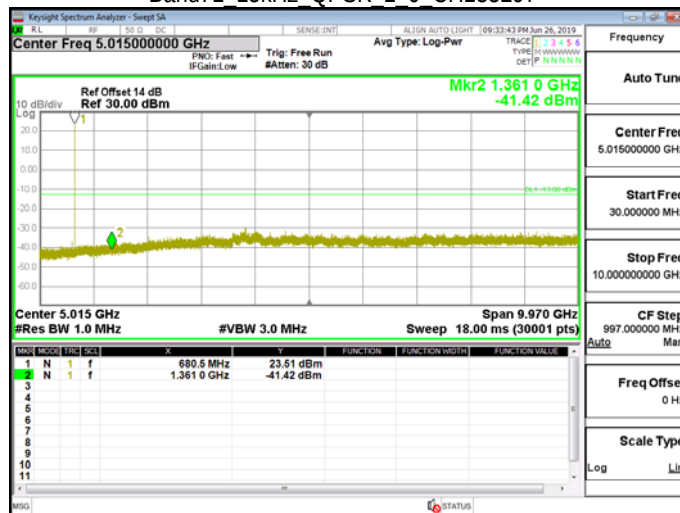
Band71 15kHz QPSK 1 0 CH133123



Band71 3.75kHz BPSK 1 0 CH133297



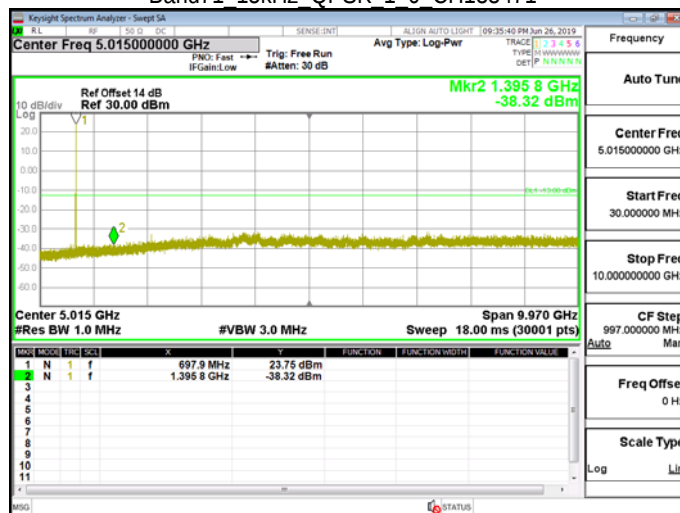
Band71 15kHz QPSK 1 0 CH133297



Band71 3.75kHz BPSK 1 0 CH133471



Band71 15kHz QPSK 1 0 CH133471

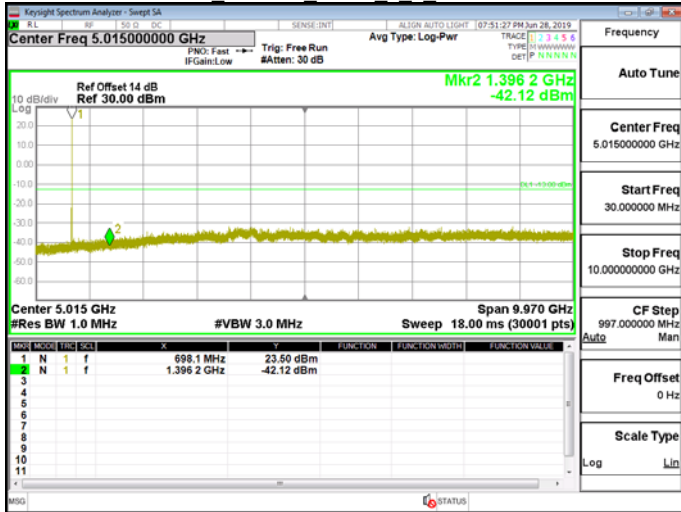


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Band85 3.75kHz BPSK 1 0 CH134003



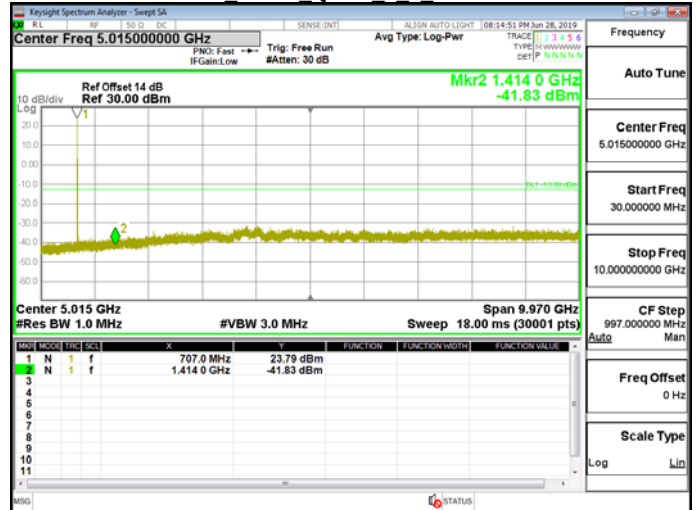
Band85 15kHz QPSK 1 0 CH134003



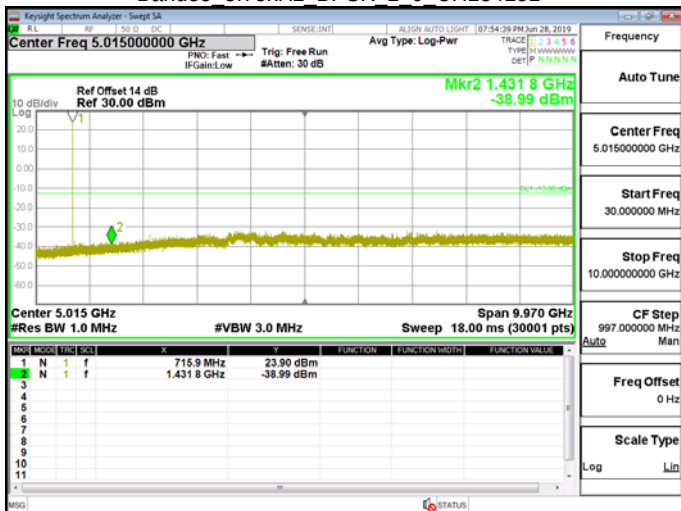
Band85 3.75kHz BPSK 1 0 CH134092



Band85 15kHz QPSK 1 0 CH134092



Band85 3.75kHz BPSK 1 0 CH134181



Band85 15kHz QPSK 1 0 CH134181



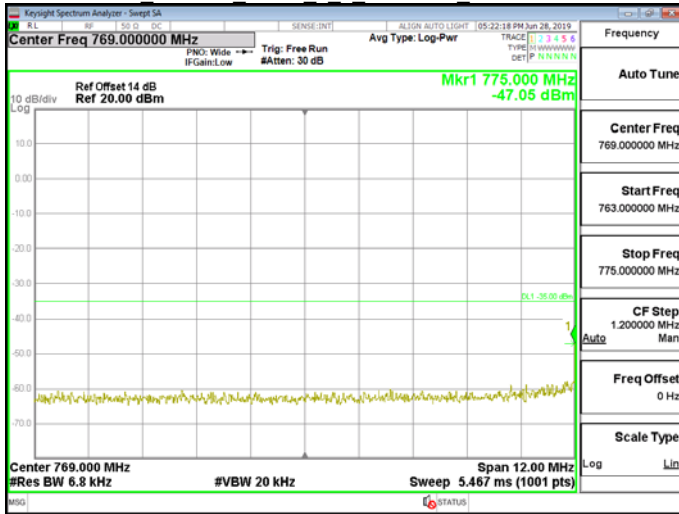
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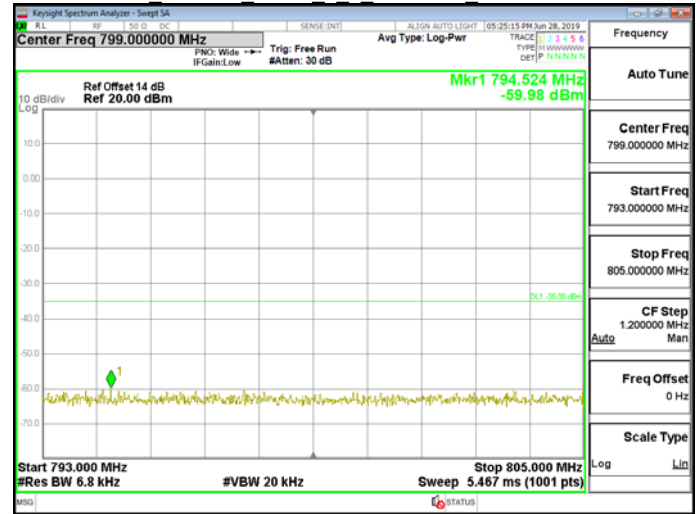
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8.5.3 Emissions in 1559-1610 MHz

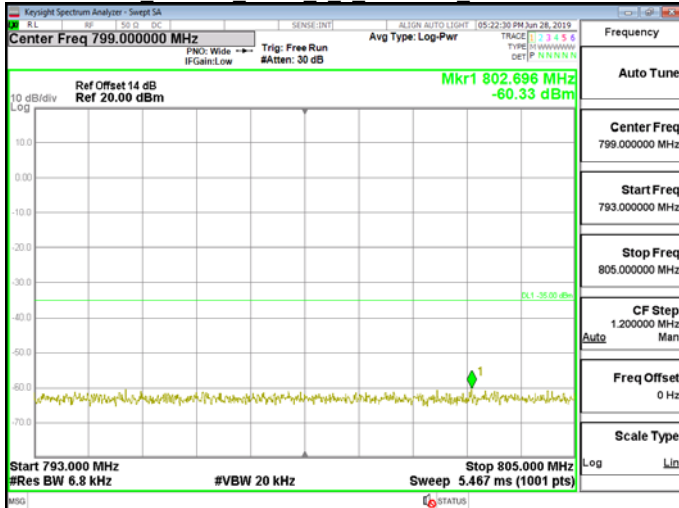
Band13 3.75kHz BPSK 1 0 CH23181 763-775MHz



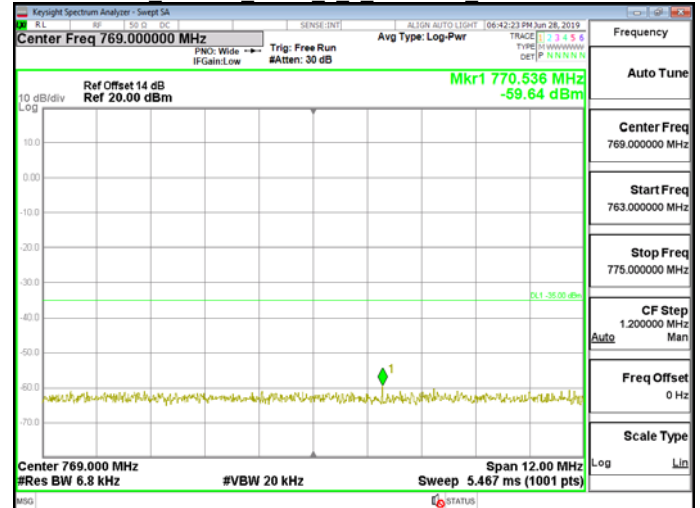
Band13 3.75kHz BPSK 1 0 CH23230 793-805MHz



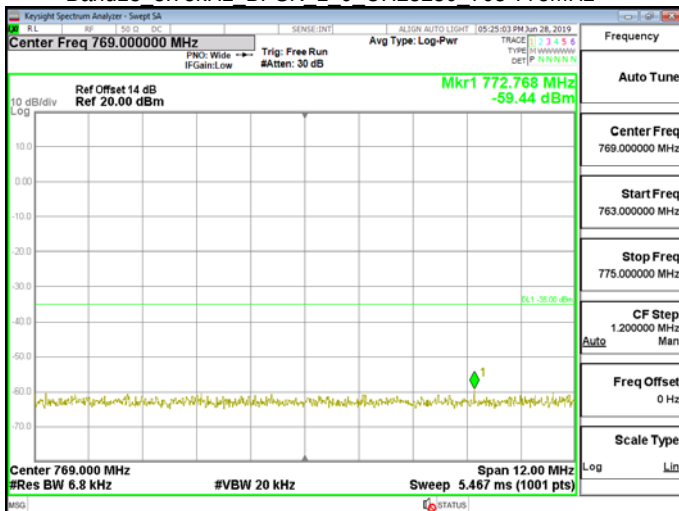
Band13 3.75kHz BPSK 1 0 CH23181 793-805MHz



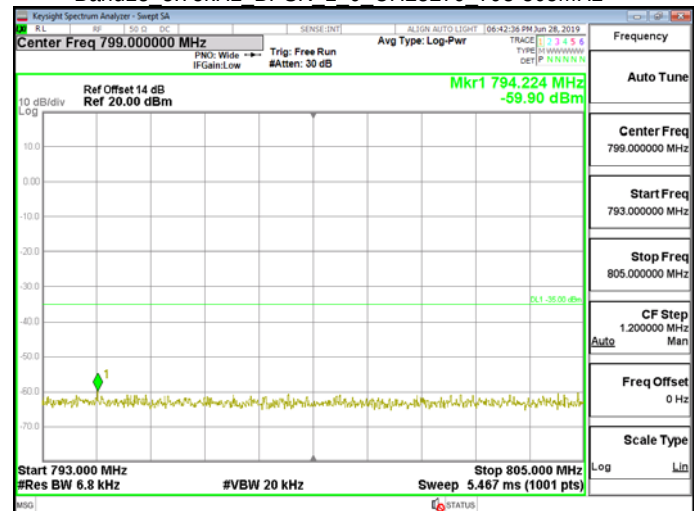
Band13 3.75kHz BPSK 1 0 CH23279 763-775MHz



Band13 3.75kHz BPSK 1 0 CH23230 763-775MHz



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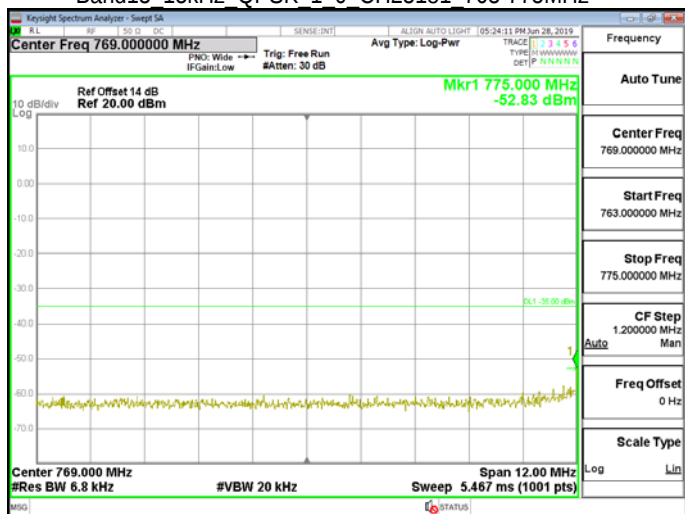


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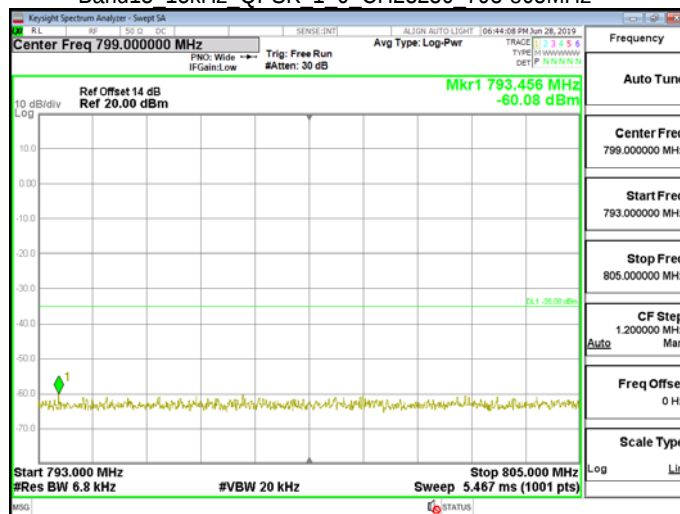
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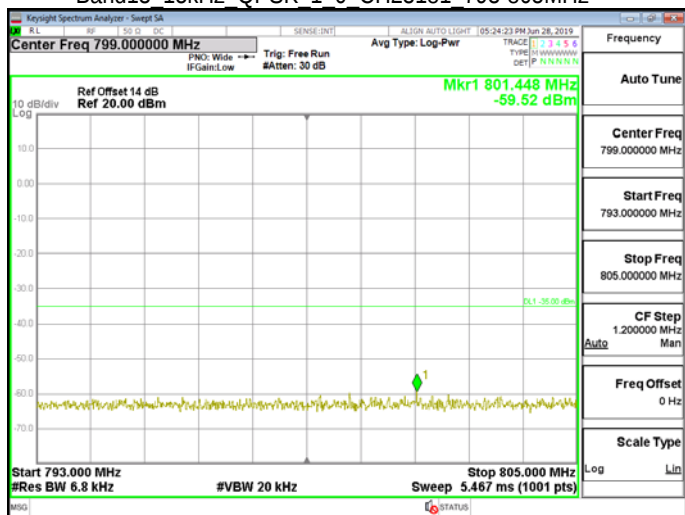
Band13 15kHz QPSK 1 0 CH23181 763-775MHz



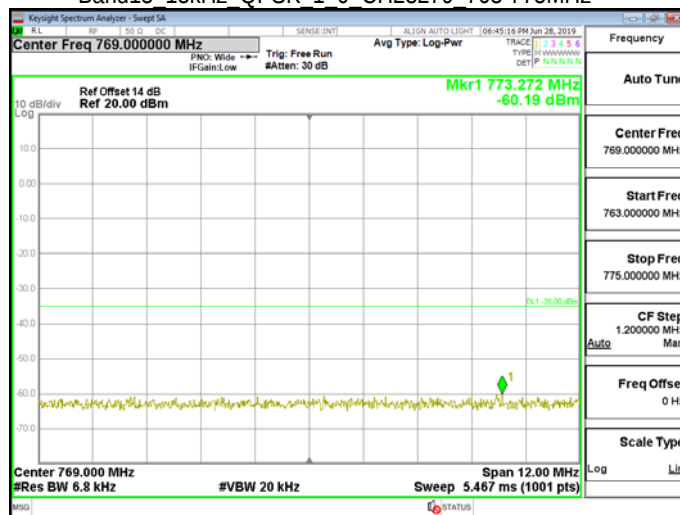
Band13 15kHz QPSK 1 0 CH23230 793-805MHz



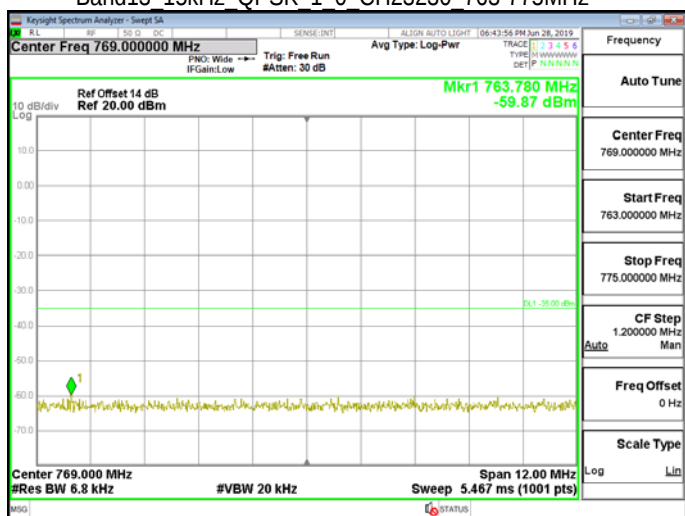
Band13 15kHz QPSK 1 0 CH23181 793-805MHz



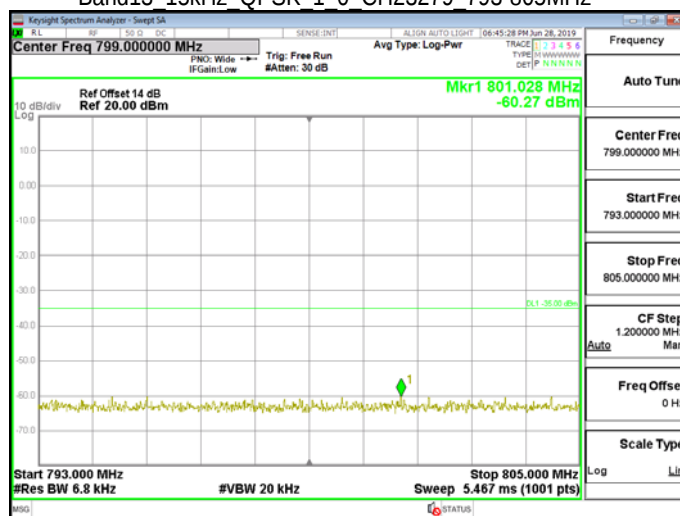
Band13 15kHz QPSK 1 0 CH23279 763-775MHz



Band13 15kHz QPSK 1 0 CH23230 763-775MHz



Band13 15kHz QPSK 1 0 CH23279 793-805MHz



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9 FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT

9.1 Standard Applicable

According to FCC §2.1053,

FCC §22.917(a) , §24.238(a) , §27.53 (h) , the magnitude of each spurious and harmonic emission that can be detected when the equipment is operated under the conditions specified in the instruction manual and/ or alignment procedure, shall not be less than $43 + 10 \log$ (mean output power in watts) dBc below the mean power output outside a license's frequency block (-13dBm).

§27.53 (c)

(2) On any frequency outside the 776– 788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log$ (P) dB (-13dBm)

(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $65 + 10 \log$ (P) dB in a 6.25 kHz band segment, for mobile and portable stations;

§27.53 (f) For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

FCC §27.53(c) (5) & FCC §27.53(g)

Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

FCC §27.53(h) (3)

Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

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According to RSS-132 §5.5

Mobile and base station equipment shall comply with the limits in (i) and (ii) below.

(i) In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least $43 + 10 \log_{10} p$ (watts).

(ii)

After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least $43 + 10 \log_{10} p$ (watts). If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.

According to RSS-133 §6.5.1

Equipment shall comply with the limits in (i) and (ii) below.

(i) In the 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least $43 + 10 \log_{10} p$ (watts).

(ii) After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least $43 + 10 \log_{10} p$ (watts). If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.

According to RSS-139 §6.5

(i) In the first 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in watts) by at least $43 + 10 \log_{10}(P)$, dB.

(ii) After the first 1.0 MHz outside the equipment's operating frequency block, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in watts) by at least $43 + 10 \log_{10}(P)$, dB.

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Table 2 — Unwanted Emissions for Mobile, Portable and Low-Power Fixed Subscriber Equipment

Frequency (MHz)	Attenuation (dB)
<2200	$43 + 10 \log_{10}(p)$
2200 - 2288	$70 + 10 \log_{10}(p)$
2288 - 2292	$67 + 10 \log_{10}(p)$
2292 - 2296	$61 + 10 \log_{10}(p)$
2296 - 2300	$55 + 10 \log_{10}(p)$
2300 - 2305	$43 + 10 \log_{10}(p)$
2305 - 2320	$43 + 10 \log_{10}(p)$ ^{Note}
2320 - 2324	$55 + 10 \log_{10}(p)$
2324 - 2328	$61 + 10 \log_{10}(p)$
2328 - 2337	$67 + 10 \log_{10}(p)$
2337 - 2341	$61 + 10 \log_{10}(p)$
2341 - 2345	$55 + 10 \log_{10}(p)$
2345 - 2360	$43 + 10 \log_{10}(p)$ ^{Note}
2360 - 2365	$43 + 10 \log_{10}(p)$
2365 - 2395	$70 + 10 \log_{10}(p)$
>2395	$43 + 10 \log_{10}(p)$

Note: Measured at the edges of the highest and lowest frequency range(s) in which the equipment is designed to operate. See Section 1.2 for the permitted frequency ranges for various equipment types.

Radiated Emission Test Set-Up, Frequency Below 1000MHz

Radiated Emission Test Set-UP Frequency Over 1 GHz

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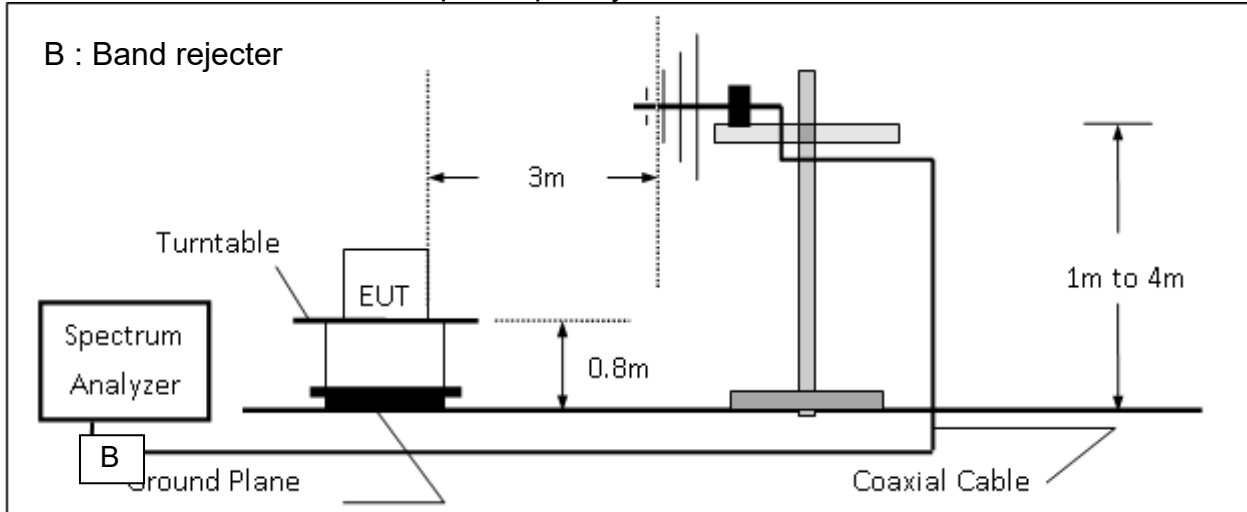
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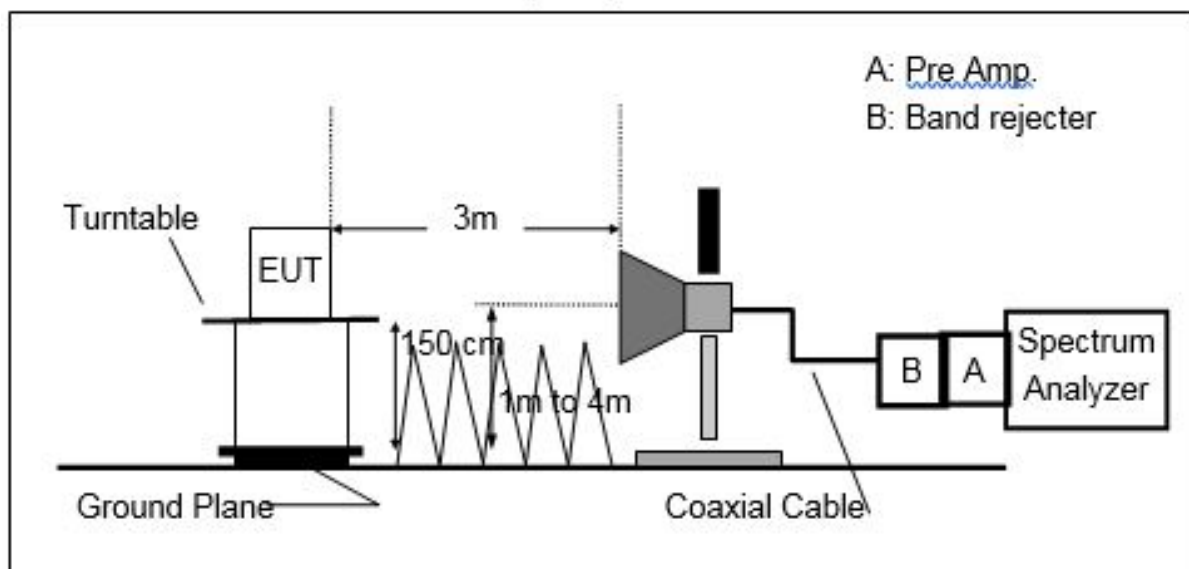
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9.2 EUT Setup

Radiated Emission Test Set-Up, Frequency Below 1000MHz



Radiated Emission Test Set-UP Frequency Over 1 GHz



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9.3 Measurement Procedure:

The EUT was placed on a non-conductive; the measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

The frequency range up to tenth harmonic was investigated for each of three fundamental frequencies (low, middle and high channels). Once spurious emission was identified, the power of the emission was determined using the substitution method.

The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency.

$$\text{ERP (dBm)} = \text{SG Level(dBm)} + \text{Antenna Gain(dBd)} + \text{Cable Loss(dB)}$$

$$\text{EIRP (dBm)} = \text{SG Level(dBm)} + \text{Antenna Gain(dBi)} + \text{Cable Loss(dB)}$$

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9.4 Measurement Equipment Used:

966A Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
DC Power Supply	GWINSTEK	SPS-3610	GPE880163	01/14/2019	01/13/2020
PSA Series Spectrum Analyzer	Agilent	E4446A	MY46180323	05/29/2019	05/28/2020
Digital Thermo-Hygro Meter	WISEWIND	1206	D07	01/30/2019	01/29/2020
Pre-Amplifier	MITEQ	AMF-6F-260400-40-8P	985646	02/26/2019	02/25/2020
Pre-Amplifier	EMEC	EM330	60609	02/26/2019	02/25/2020
Pre-Amplifier	HP	8449B	3008A00965	02/26/2019	02/25/2020
Horn Antenna	Schwarzbeck	BBHA9170	184	12/27/2018	12/26/2019
Horn Antenna	ETS LINDGREN	3116	26370	12/26/2018	12/25/2019
Horn Antenna	SCHWARZBECK	BBHA 9120D	779	03/09/2019	03/08/2020
Bilog Antenna	Sunol Sciences	JB3	A030105	07/13/2018	07/12/2019
Bilog Antenna	Sunol Sciences	JB1	A052609	03/06/2019	03/05/2020
double Ridged Guide Horn Antenna	ETC	MCTD 1209	DRH13M02003	08/20/2018	08/19/2019
Loop Antenna	COM-POWER	AL-130	121051	03/22/2019	03/21/2020
Loop Antenna	ETS.LINDGREN	6502	148045	10/08/2018	10/07/2019
Attenuator	Marvelous	MVE2213-10	RF80	02/26/2019	02/25/2020
Radio Communication Analyzer	Anritsu	MT8821C	6261786084	01/09/2019	01/08/2020
Cable	HUBER SUHNER	SUCOFLEX 104PEA	25157	02/26/2019	02/25/2020
Cable	HUBER SUHNER	SUCOFLEX 104PEA	20995	02/26/2019	02/25/2020
High Pass Filter	Woken	EWT-57-0209	RF43	02/26/2019	02/25/2020
High Pass Filter	R&S	F13 HPF 3GHz	RF64	02/26/2019	02/25/2020
Notch Filter	EWT	EWT-54-0037	RF53	02/26/2019	02/25/2020
Notch Filter	EWT	EWT-54-0038	RF55	02/26/2019	02/25/2020
Band Reject Filter	WI	WRCJV2300/2700-2240/2760-40/12SS	2	02/26/2019	02/25/2020
Band Reject Filter	WI	WRCGV695/920-635/980-40/12SS	2	02/26/2019	02/25/2020
Software	e3 V6.11-20180413				

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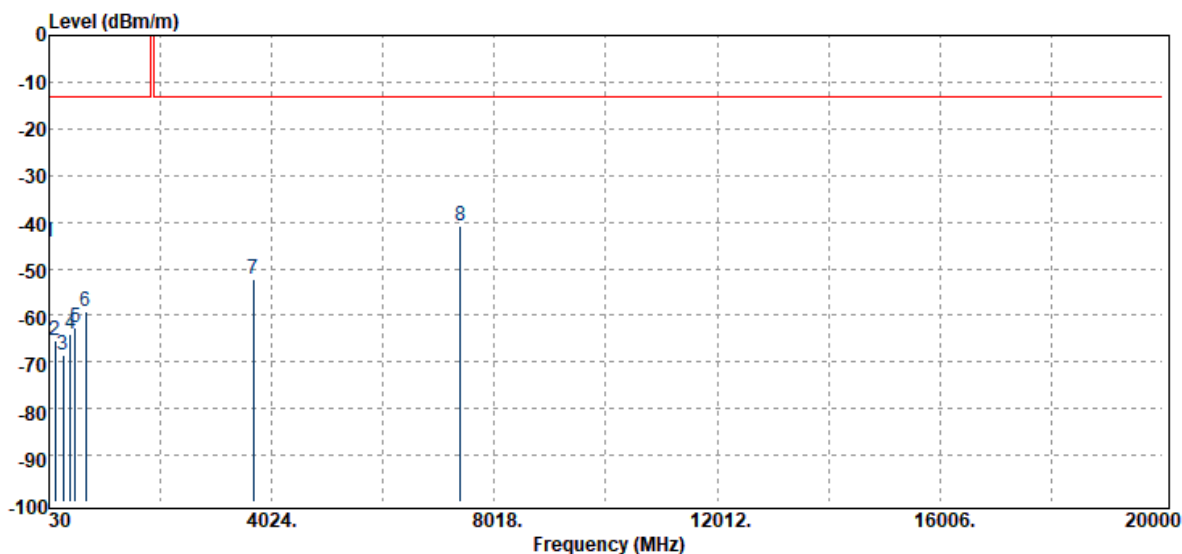
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9.5 Measurement Result:

Radiated Spurious Emission Measurement Result: NB_IOT-Band 2 (The Worst Case)

Report Number	: T190624W03	Test Date	: 2019-07-04
Operation Mode	: NB_IOT B2 3.75kHz BPSK 1 0	Temp./Humi.	: 26/62
Test Mode	: Tx CH Low	Antenna Pol.	: VERTICAL
EUT Pol	: H Plane	Engineer	: Jerry
Test Channel	: 18601_1850.1 MHz		



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
30.00	-44.38	-13.83	-30.10	-0.45	-13.00	-31.38
133.79	-65.41	-54.94	-9.52	-0.95	-13.00	-52.41
280.26	-68.46	-64.49	-2.59	-1.38	-13.00	-55.46
418.00	-63.96	-60.37	-1.90	-1.69	-13.00	-50.96
495.60	-62.59	-58.73	-2.00	-1.86	-13.00	-49.59
687.66	-59.33	-55.77	-1.35	-2.21	-13.00	-46.33
3700.20	-52.34	-59.13	12.50	-5.71	-13.00	-39.34
7400.40	-40.99	-43.52	10.60	-8.07	-13.00	-27.99

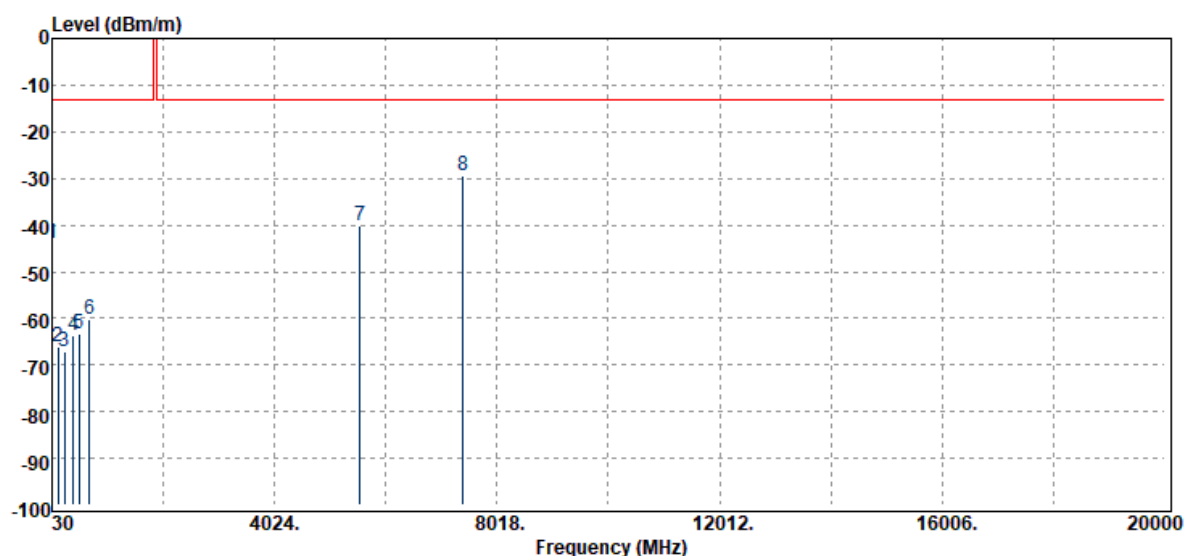
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Report Number : T190624W03
Operation Mode : NB_IOT B2 3.75kHz BPSK 1 0
Test Mode : Tx CH Low
EUT Pol : H Plane
Test Channel : 18601_1850.1 MHz

Test Date :2019-07-04
Temp./Humi. : 26/62
Antenna Pol. :HORIZONTAL
Engineer : Jerry



Freq.	EIRP/ERP	SG	Antenna	Cable	Limit	Margin
MHz	dBm	Output Level	Gain	Loss	dBm	dB
		dBm	dBi/dBd	dB		
30.00	-43.88	-13.33	-30.10	-0.45	-13.00	-30.88
144.46	-66.01	-57.21	-7.81	-0.99	-13.00	-53.01
248.25	-67.27	-64.14	-1.83	-1.30	-13.00	-54.27
408.30	-63.54	-60.07	-1.80	-1.67	-13.00	-50.54
507.24	-63.19	-59.49	-1.81	-1.89	-13.00	-50.19
697.36	-60.03	-56.41	-1.40	-2.22	-13.00	-47.03
5550.30	-40.06	-46.17	13.20	-7.09	-13.00	-27.06
7400.40	-29.44	-31.97	10.60	-8.07	-13.00	-16.44

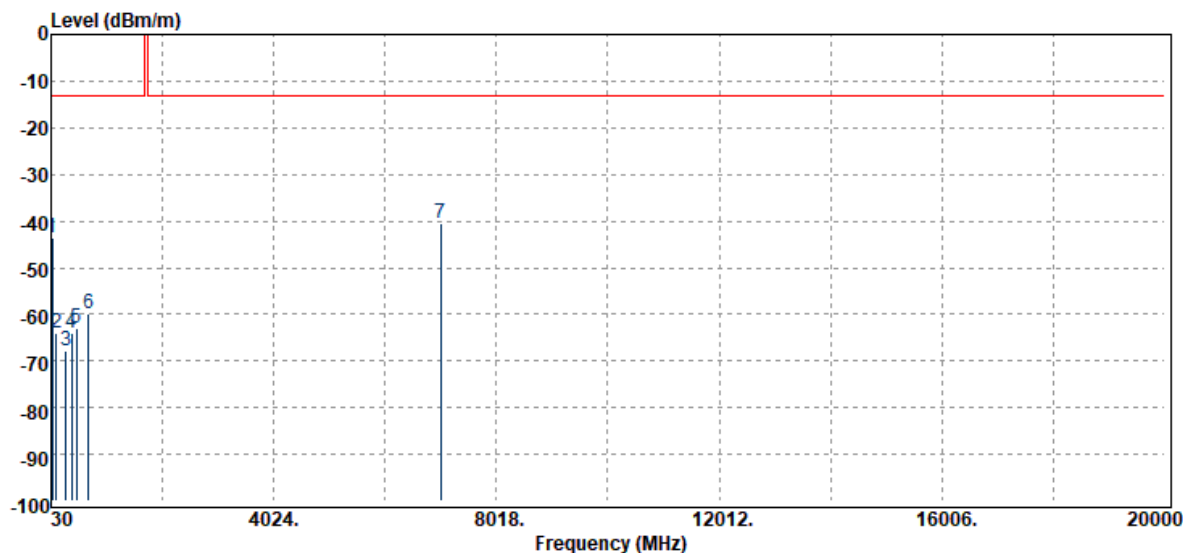
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Radiated Spurious Emission Measurement Result: NB_IOT-Band 4 (The Worst Case)

Report Number	: T190624W03	Test Date	: 2019-07-04
Operation Mode	: NB_IOT B4 3.75kHz BPSK 1 47	Temp./Humi.	: 26/62
Test Mode	: Tx CH High	Antenna Pol.	: VERTICAL
EUT Pol	: H Plane	Engineer	: Jerry
Test Channel	: 20399_1754.9 MHz		



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
44.55	-43.44	-27.04	-15.86	-0.54	-13.00	-30.44
129.91	-64.02	-52.90	-10.19	-0.93	-13.00	-51.02
293.84	-67.95	-64.41	-2.12	-1.42	-13.00	-54.95
405.39	-64.13	-60.66	-1.80	-1.67	-13.00	-51.13
490.75	-63.08	-59.06	-2.17	-1.85	-13.00	-50.08
700.27	-59.81	-56.17	-1.41	-2.23	-13.00	-46.81
7019.60	-40.49	-43.54	11.00	-7.95	-13.00	-27.49

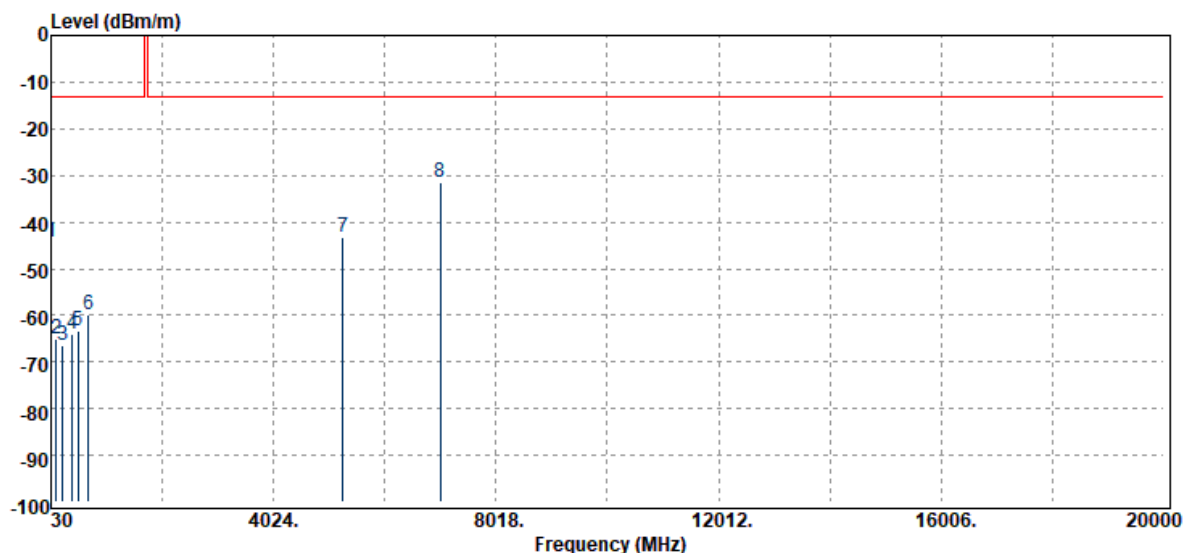
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Report Number : T190624W03
Operation Mode : NB_IOT B4 3.75kHz BPSK 1 47
Test Mode : Tx CH High
EUT Pol : H Plane
Test Channel : 20399_1754.9 MHz

Test Date : 2019-07-04
Temp./Humi. : 26/62
Antenna Pol. : HORIZONTAL
Engineer : Jerry



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
30.00	-44.12	-13.57	-30.10	-0.45	-13.00	-31.12
128.94	-65.18	-54.14	-10.11	-0.93	-13.00	-52.18
243.40	-66.51	-63.27	-1.96	-1.28	-13.00	-53.51
408.30	-64.09	-60.62	-1.80	-1.67	-13.00	-51.09
519.85	-63.22	-59.91	-1.40	-1.91	-13.00	-50.22
699.30	-59.84	-56.21	-1.40	-2.23	-13.00	-46.84
5264.70	-43.18	-49.56	13.20	-6.82	-13.00	-30.18
7019.60	-31.54	-34.59	11.00	-7.95	-13.00	-18.54

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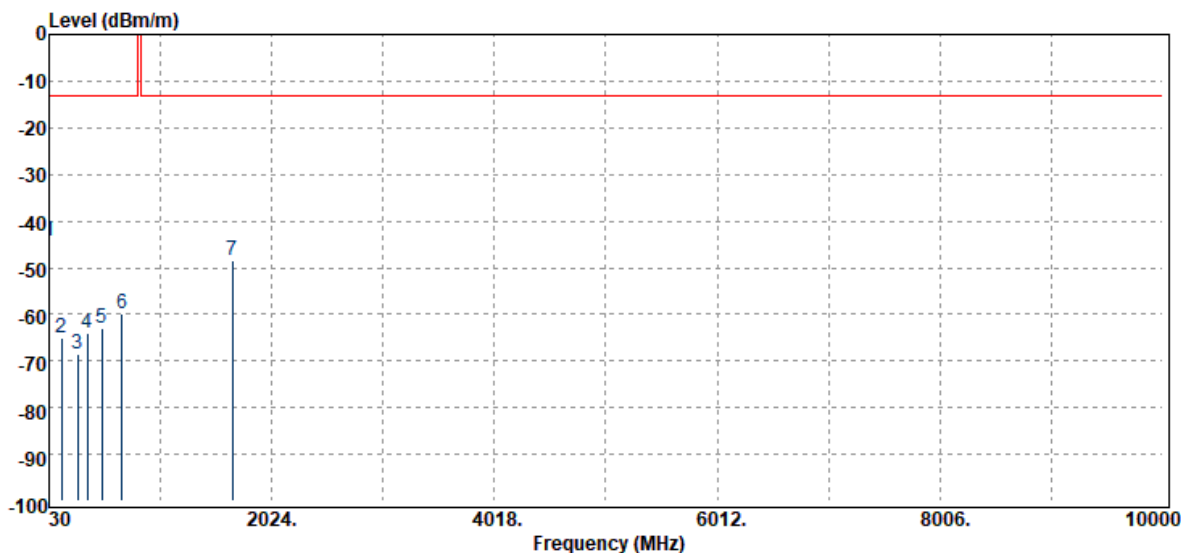
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Radiated Spurious Emission Measurement Result: NB_IOT-Band 5 (The Worst Case)

Report Number	: T190624W03	Test Date	: 2019-07-04
Operation Mode	: NB_IOT B5 3.75kHz BPSK 1 47	Temp./Humi.	: 26/62
Test Mode	: Tx CH Mid	Antenna Pol.	: VERTICAL
EUT Pol	: H Plane	Engineer	: Jerry
Test Channel	: 20525_836.5 MHz		



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
30.00	-44.45	-13.90	-30.10	-0.45	-13.00	-31.45
141.55	-65.13	-55.85	-8.30	-0.98	-13.00	-52.13
288.99	-68.46	-64.82	-2.24	-1.40	-13.00	-55.46
369.50	-63.94	-60.55	-1.80	-1.59	-13.00	-50.94
505.30	-62.85	-59.08	-1.89	-1.88	-13.00	-49.85
684.75	-59.92	-56.41	-1.30	-2.21	-13.00	-46.92
1673.00	-48.44	-54.70	9.84	-3.58	-13.00	-35.44

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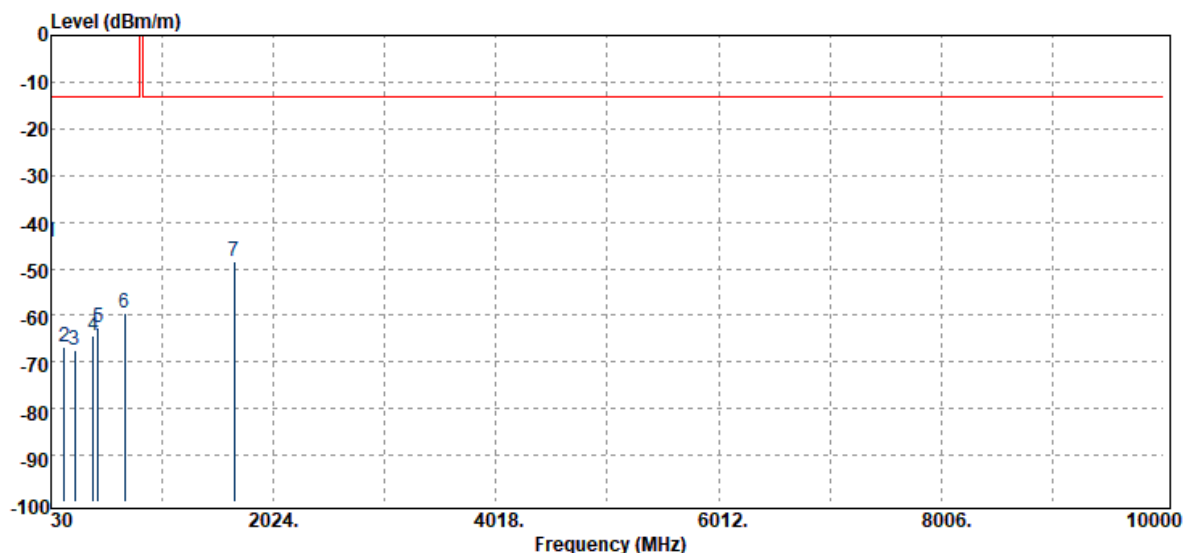
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Report Number : T190624W03
Operation Mode : NB_IOT B5 3.75kHz BPSK 1 47
Test Mode : Tx CH Mid
EUT Pol : H Plane
Test Channel : 20525_836.5 MHz

Test Date : 2019-07-04
Temp./Humi. : 26/62
Antenna Pol. : HORIZONTAL
Engineer : Jerry



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
30.00	-44.24	-13.69	-30.10	-0.45	-13.00	-31.24
151.25	-66.77	-58.71	-7.05	-1.01	-13.00	-53.77
240.49	-67.34	-63.99	-2.08	-1.27	-13.00	-54.34
410.24	-64.37	-60.89	-1.80	-1.68	-13.00	-51.37
451.95	-62.47	-58.61	-2.10	-1.76	-13.00	-49.47
687.66	-59.60	-56.04	-1.35	-2.21	-13.00	-46.60
1673.00	-48.60	-54.86	9.84	-3.58	-13.00	-35.60

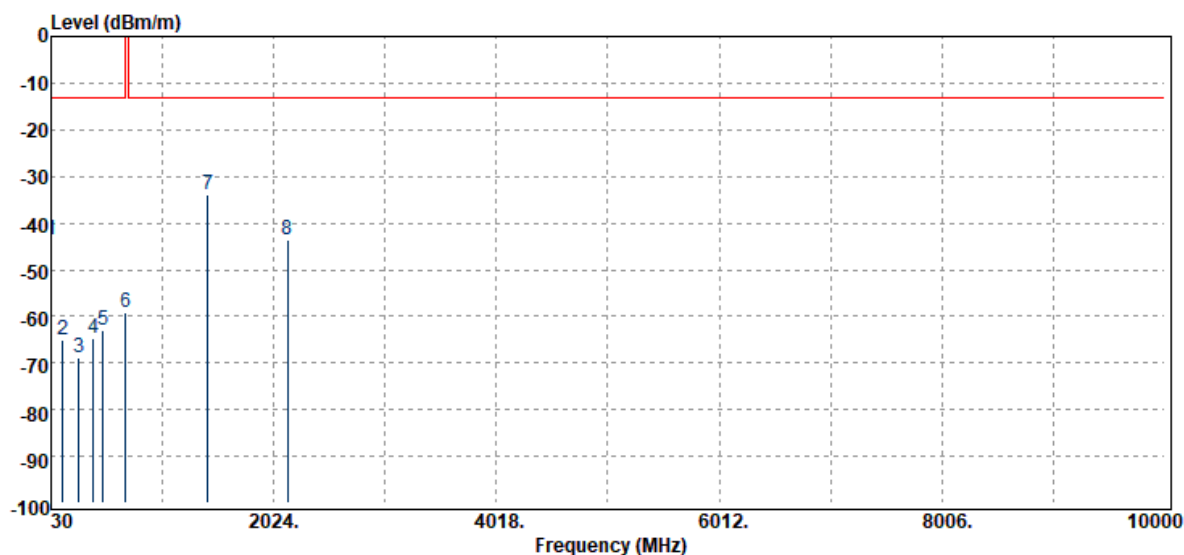
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Radiated Spurious Emission Measurement Result: NB_IOT-Band 12 (The Worst Case)

Report Number	: T190624W03	Test Date	: 2019-07-04
Operation Mode	: NB_IOT B12 3.75kHz BPSK 1 47	Temp./Humi.	: 26/62
Test Mode	: Tx CH High	Antenna Pol.	: VERTICAL
EUT Pol	: H Plane	Engineer	: Jerry
Test Channel	: 23179_715.9 MHz		



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
30.00	-43.59	-13.04	-30.10	-0.45	-13.00	-30.59
133.79	-64.93	-54.46	-9.52	-0.95	-13.00	-51.93
282.20	-68.69	-64.79	-2.51	-1.39	-13.00	-55.69
408.30	-64.59	-61.12	-1.80	-1.67	-13.00	-51.59
497.54	-62.98	-59.12	-2.00	-1.86	-13.00	-49.98
697.36	-59.08	-55.46	-1.40	-2.22	-13.00	-46.08
1431.80	-33.83	-38.74	8.19	-3.28	-13.00	-20.83
2147.70	-43.76	-49.03	9.42	-4.15	-13.00	-30.76

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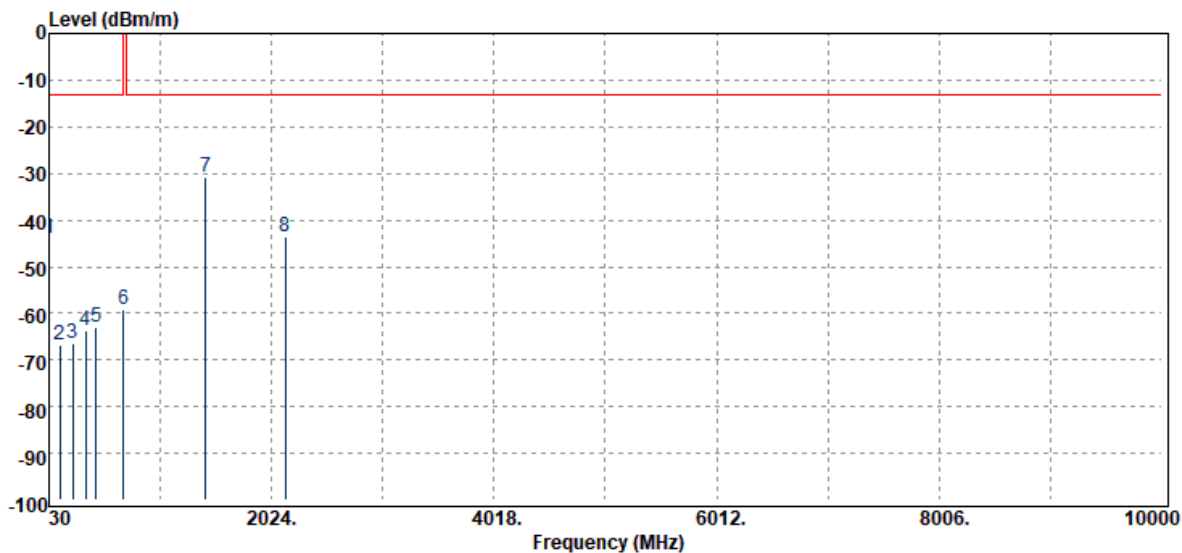
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Report Number : T190624W03
Operation Mode : NB_IOT B12 3.75kHz BPSK 1 47
Test Mode : Tx CH High
EUT Pol : H Plane
Test Channel : 23179_715.9 MHz

Test Date : 2019-07-04
Temp./Humi. : 26/62
Antenna Pol. : HORIZONTAL
Engineer : Jerry



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
31.94	-44.02	-15.39	-28.16	-0.47	-13.00	-31.02
128.94	-66.95	-55.91	-10.11	-0.93	-13.00	-53.95
246.31	-66.38	-63.22	-1.87	-1.29	-13.00	-53.38
359.80	-63.53	-60.18	-1.78	-1.57	-13.00	-50.53
451.95	-62.92	-59.06	-2.10	-1.76	-13.00	-49.92
696.39	-59.08	-55.46	-1.40	-2.22	-13.00	-46.08
1431.80	-30.86	-35.77	8.19	-3.28	-13.00	-17.86
2147.70	-43.75	-49.02	9.42	-4.15	-13.00	-30.75

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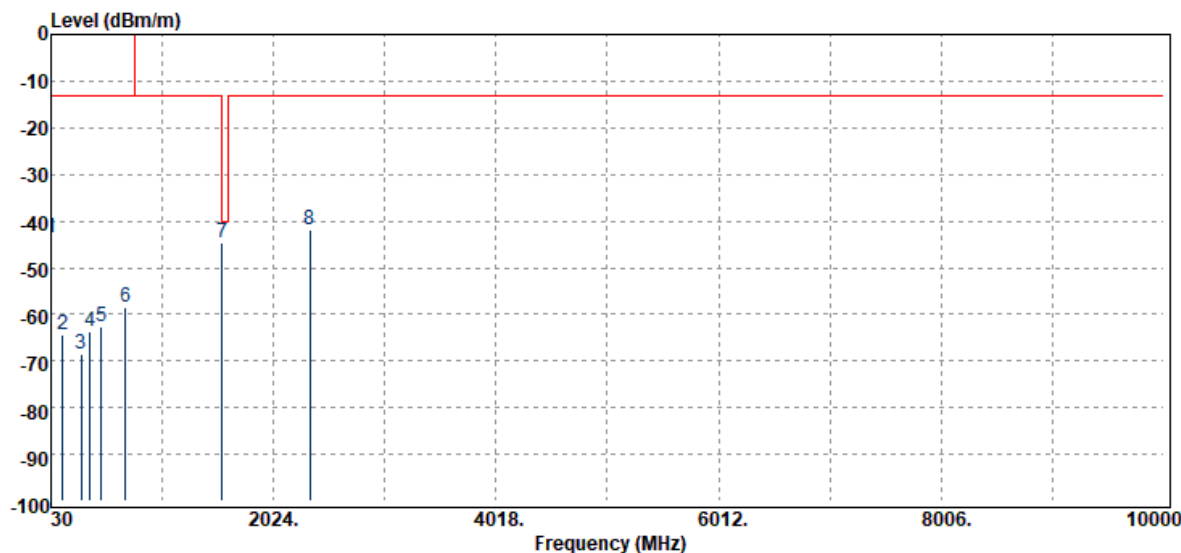
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Radiated Spurious Emission Measurement Result: NB_IOT-Band 13 (The Worst Case)

Report Number	: T190624W03	Test Date	: 2019-07-04
Operation Mode	: NB_IOT B13 3.75kHz BPSK 1 47	Temp./Humi.	: 26/62
Test Mode	: Tx CH Mid	Antenna Pol.	: VERTICAL
EUT Pol	: H Plane	Engineer	: Jerry
Test Channel	: 23230_782 MHz		



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
30.00	-43.73	-13.18	-30.10	-0.45	-13.00	-30.73
133.79	-64.37	-53.90	-9.52	-0.95	-13.00	-51.37
298.69	-68.68	-65.22	-2.03	-1.43	-13.00	-55.68
382.11	-63.68	-60.60	-1.46	-1.62	-13.00	-50.68
478.14	-62.70	-58.48	-2.40	-1.82	-13.00	-49.70
696.39	-58.57	-54.95	-1.40	-2.22	-13.00	-45.57
1564.00	-44.79	-50.73	9.38	-3.44	-40.00	-4.79
2346.00	-41.78	-47.26	9.87	-4.39	-13.00	-28.78

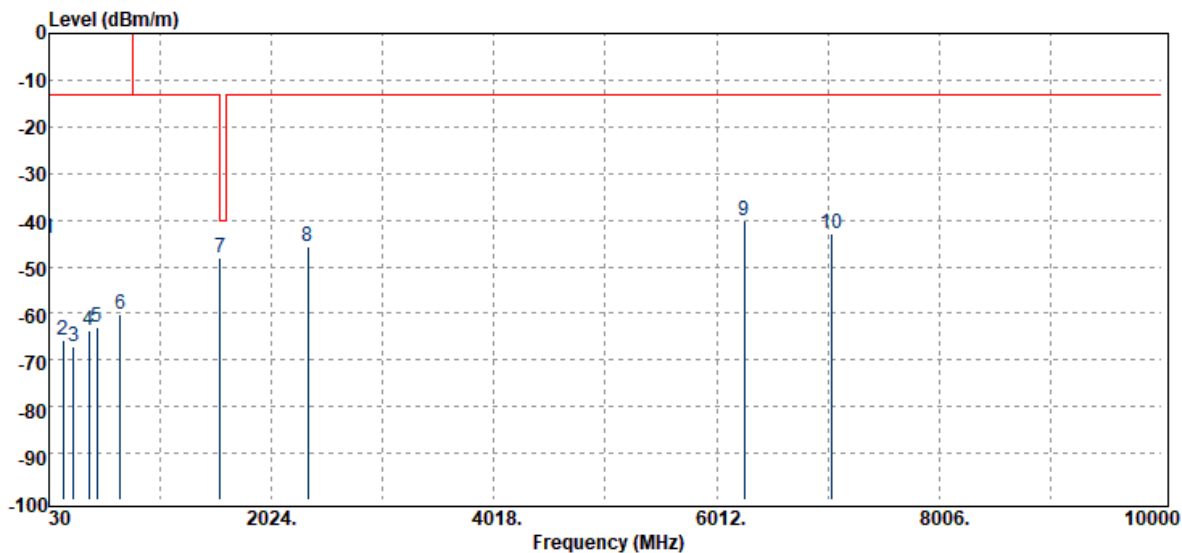
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Report Number : T190624W03
Operation Mode : NB_IOT B13 3.75kHz BPSK 1 47
Test Mode : Tx CH Mid
EUT Pol : H Plane
Test Channel : 23230_782 MHz

Test Date : 2019-07-04
Temp./Humi. : 26/62
Antenna Pol. : HORIZONTAL
Engineer : Jerry



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
30.00	-44.01	-13.46	-30.10	-0.45	-13.00	-31.01
154.16	-65.81	-58.01	-6.78	-1.02	-13.00	-52.81
253.10	-67.00	-64.01	-1.68	-1.31	-13.00	-54.00
385.99	-63.49	-60.46	-1.40	-1.63	-13.00	-50.49
461.65	-62.86	-58.91	-2.17	-1.78	-13.00	-49.86
665.35	-60.10	-56.43	-1.49	-2.18	-13.00	-47.10
1564.00	-48.25	-54.19	9.38	-3.44	-40.00	-8.25
2346.00	-45.50	-50.98	9.87	-4.39	-13.00	-32.50
6256.00	-40.06	-45.06	12.50	-7.50	-13.00	-27.06
7038.00	-43.02	-46.06	11.00	-7.96	-13.00	-30.02

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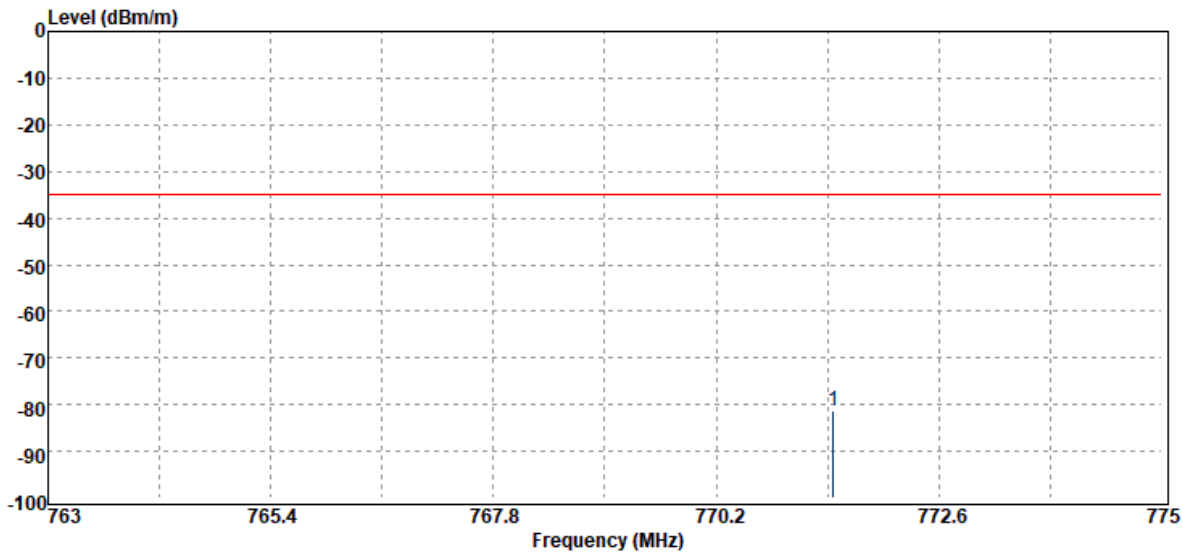
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Radiated Spurious Emission Measurement Result: LTE-Band 13 (763~755MHz) (The Worst Case)

Report Number : T190624W03
Operation Mode : NB_IOT B13 3.75kHz BPSK 1 47
Test Mode : Tx CH Mid
EUT Pol : H Plane
Test Channel : 23230_782 MHz

Test Date : 2019-07-04
Temp./Humi. : 26/62
Antenna Pol. : VERTICAL
Engineer : Jerry



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
771.46	-81.35	-77.62	-1.40	-2.33	-35.00	-46.35

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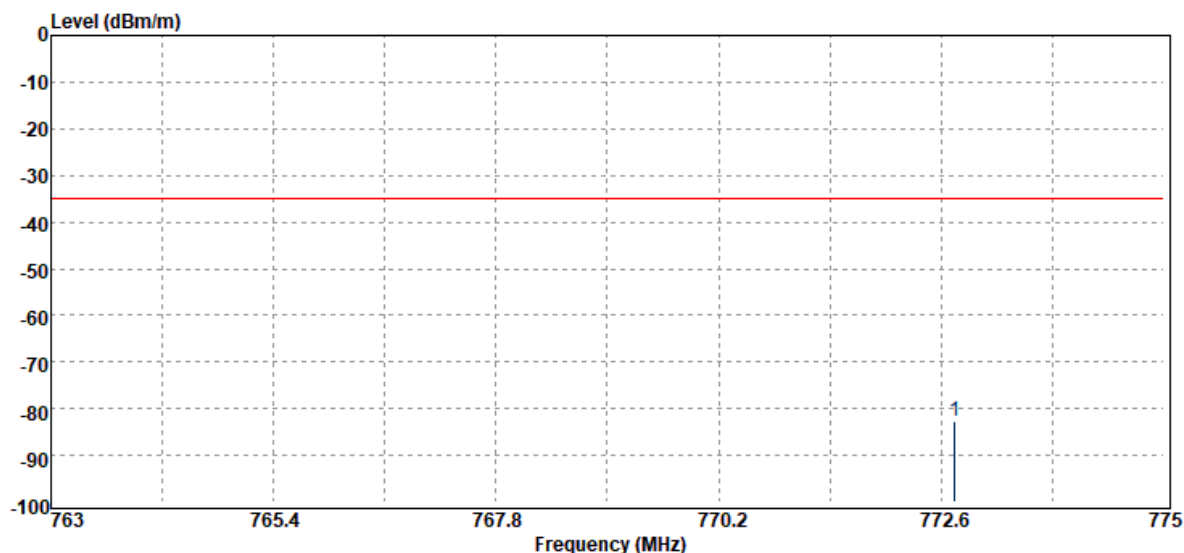
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Report Number : T190624W03
Operation Mode : NB_IOT B13 3.75kHz BPSK 1 47
Test Mode : Tx CH Mid
EUT Pol : H Plane
Test Channel : 23230_782 MHz

Test Date :2019-07-04
Temp./Humi. : 26/62
Antenna Pol. :HORIZONTAL
Engineer : Jerry



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
772.74	-82.85	-79.11	-1.40	-2.34	-35.00	-47.85

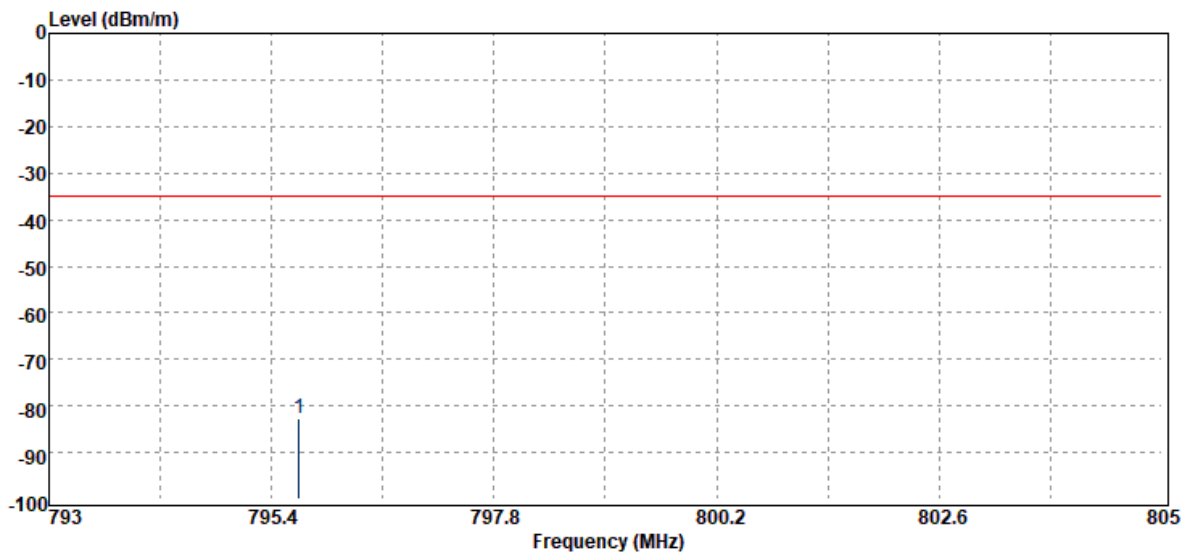
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Radiated Spurious Emission Measurement Result: LTE-Band 13 (793~805MHz) (The Worst Case)

Report Number	: T190624W03	Test Date	: 2019-07-04
Operation Mode	: NB_IOT B13 3.75kHz BPSK 1 47	Temp./Humi.	: 26/62
Test Mode	: Tx CH Mid	Antenna Pol.	: VERTICAL
EUT Pol	: H Plane	Engineer	: Jerry
Test Channel	: 23230_782 MHz		



Freq.	EIRP/ERP	SG	Antenna	Cable	Limit	Margin
MHz	dBm	Output Level	Gain	Loss	dBm	dB
		dBm	dBi/dBd	dB		
795.70	-82.63	-79.06	-1.21	-2.36	-35.00	-47.63

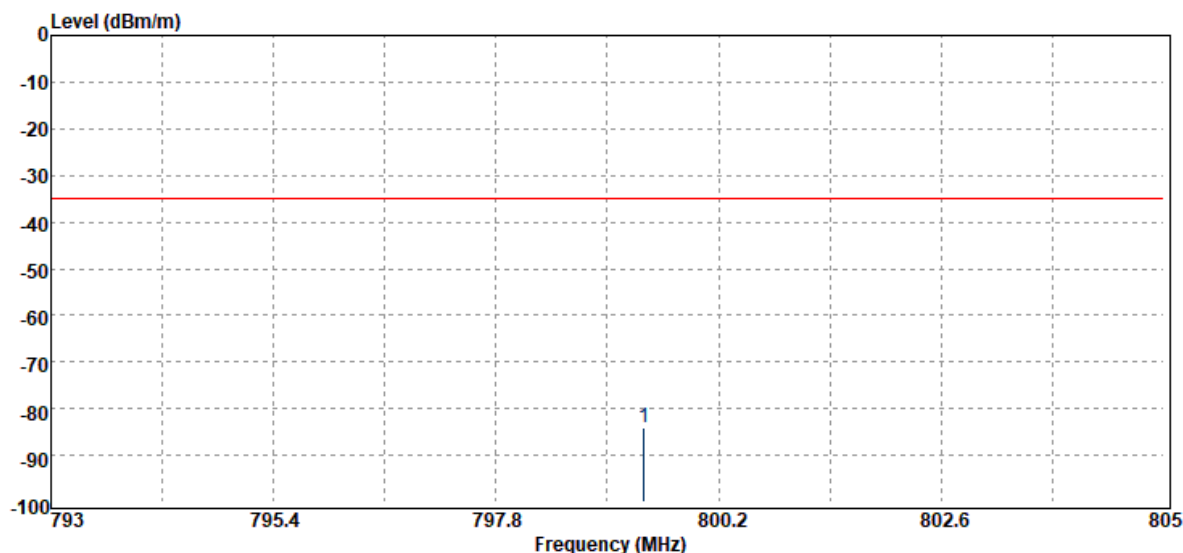
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Report Number : T190624W03
Operation Mode : NB_IOT B13 3.75kHz BPSK 1 47
Test Mode : Tx CH Mid
EUT Pol : H Plane
Test Channel : 23230_782 MHz

Test Date : 2019-07-04
Temp./Humi. : 26/62
Antenna Pol. : HORIZONTAL
Engineer : Jerry



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
799.40	-84.11	-80.45	-1.29	-2.37	-35.00	-49.11

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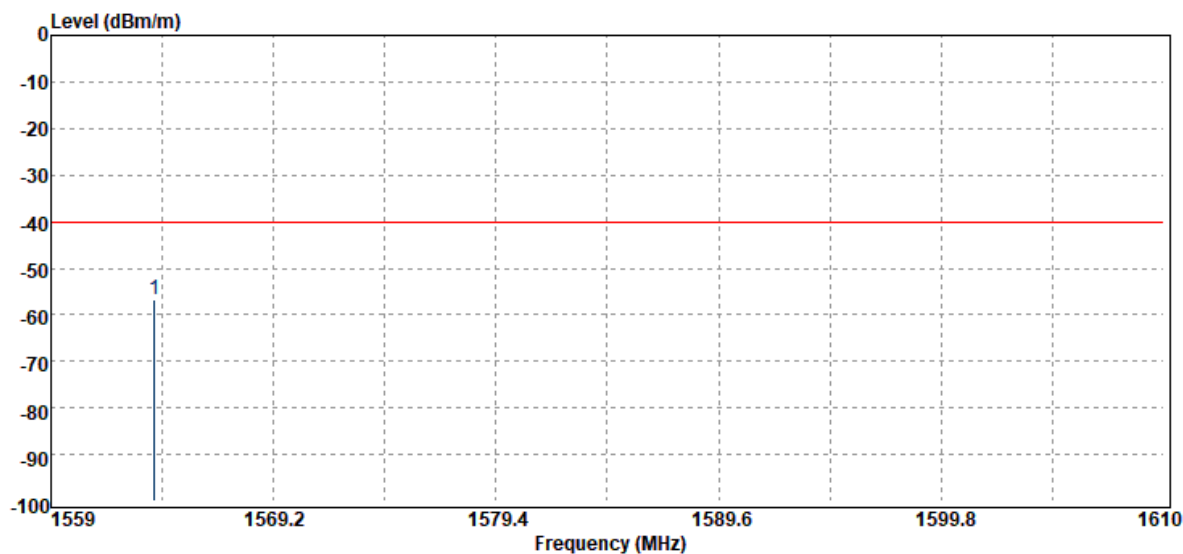
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Radiated Spurious Emission Measurement Result: LTE-Band 13 (1559~1610MHz) (The Worst Case)

Report Number : T190624W03
Operation Mode : NB_IOT B13 3.75kHz BPSK 1 47
Test Mode : Tx CH Mid
EUT Pol : H Plane
Test Channel : 23230_782 MHz

Test Date : 2019-07-04
Temp./Humi. : 26/62
Antenna Pol. : VERTICAL
Engineer : Jerry



Freq.	EIRP/ERP	SG	Antenna	Cable	Limit	Margin
MHz	dBm	Output Level	Gain	Loss	dBm	dB
		dBm	dBi/dBd	dB		
1563.74	-56.71	-62.65	9.38	-3.44	-40.00	-16.71

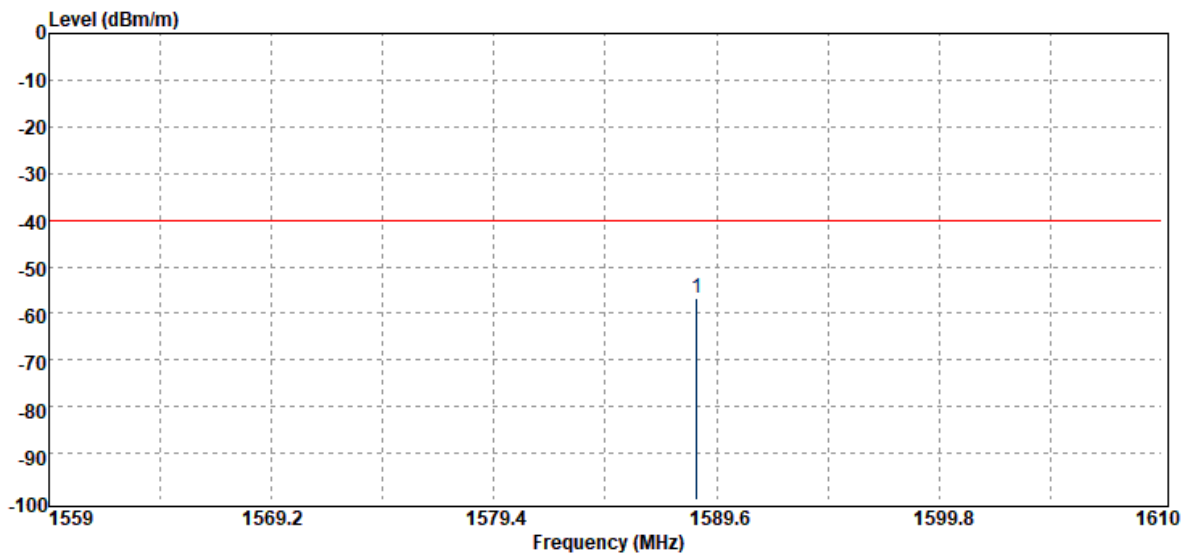
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Report Number : T190624W03
Operation Mode : NB_IOT B13 3.75kHz BPSK 1 47
Test Mode : Tx CH Mid
EUT Pol : H Plane
Test Channel : 23230_782 MHz

Test Date : 2019-07-04
Temp./Humi. : 26/62
Antenna Pol. : HORIZONTAL
Engineer : Jerry



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
1588.68	-56.72	-62.78	9.53	-3.47	-40.00	-16.72

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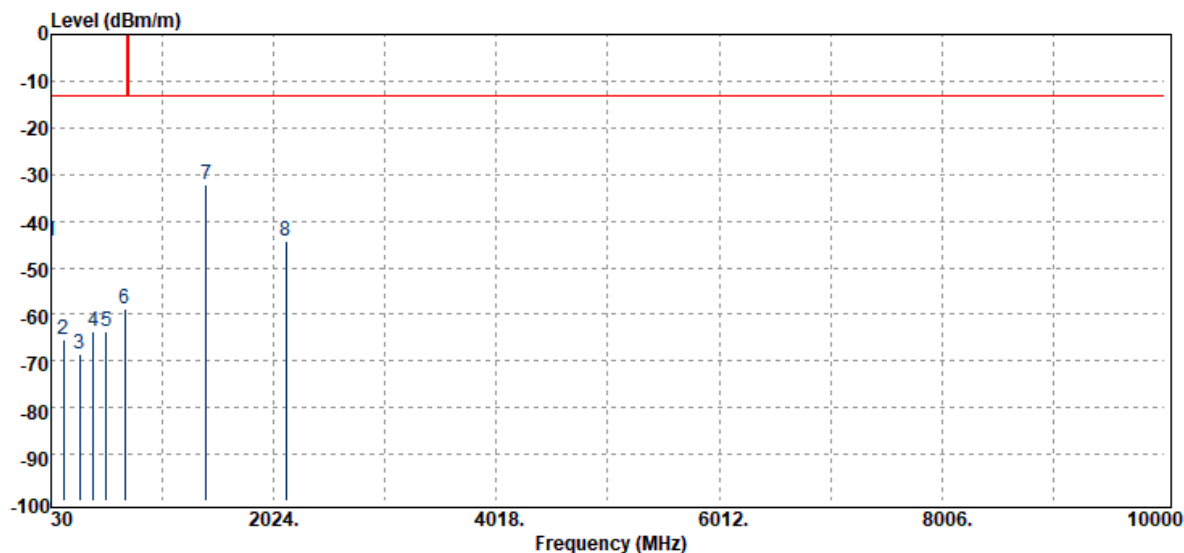
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Radiated Spurious Emission Measurement Result: NB_IOT-Band 17 (The Worst Case)

Report Number : T190624W03
Operation Mode : NB_IOT B17 3.75kHz BPSK 1 0
Test Mode : Tx CH Mid
EUT Pol : H Plane
Test Channel : 23790_710 MHz

Test Date : 2019-07-04
Temp./Humi. : 26/62
Antenna Pol. : VERTICAL
Engineer : Jerry



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
30.00	-44.13	-13.58	-30.10	-0.45	-13.00	-31.13
141.55	-65.40	-56.12	-8.30	-0.98	-13.00	-52.40
285.11	-68.60	-64.81	-2.40	-1.39	-13.00	-55.60
405.39	-63.60	-60.13	-1.80	-1.67	-13.00	-50.60
521.79	-63.50	-60.23	-1.36	-1.91	-13.00	-50.50
689.60	-58.70	-55.10	-1.39	-2.21	-13.00	-45.70
1420.00	-32.26	-37.12	8.12	-3.26	-13.00	-19.26
2130.00	-44.22	-49.65	9.56	-4.13	-13.00	-31.22

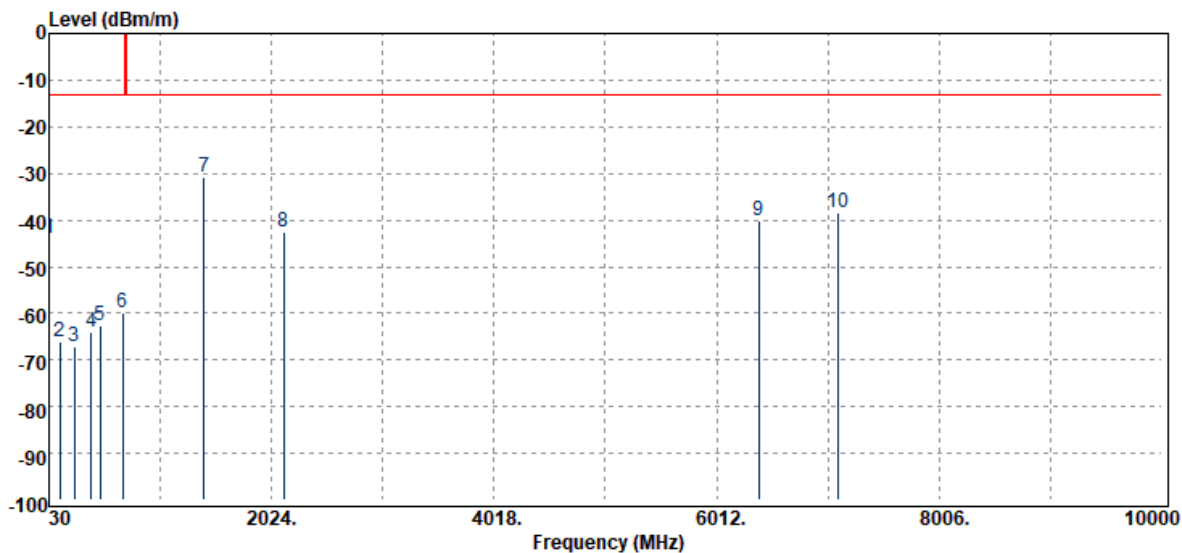
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Report Number : T190624W03
Operation Mode : NB_IOT B17 3.75kHz BPSK 1 0
Test Mode : Tx CH Mid
EUT Pol : H Plane
Test Channel : 23790_710 MHz

Test Date : 2019-07-04
Temp./Humi. : 26/62
Antenna Pol. : HORIZONTAL
Engineer : Jerry



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
30.00	-44.03	-13.48	-30.10	-0.45	-13.00	-31.03
128.94	-66.17	-55.13	-10.11	-0.93	-13.00	-53.17
255.04	-67.19	-64.28	-1.60	-1.31	-13.00	-54.19
410.24	-63.86	-60.38	-1.80	-1.68	-13.00	-50.86
485.90	-62.70	-58.58	-2.28	-1.84	-13.00	-49.70
691.54	-59.80	-56.18	-1.40	-2.22	-13.00	-46.80
1420.00	-30.74	-35.60	8.12	-3.26	-13.00	-17.74
2130.00	-42.70	-48.13	9.56	-4.13	-13.00	-29.70
6390.00	-40.29	-44.92	12.22	-7.59	-13.00	-27.29
7100.00	-38.38	-41.20	10.80	-7.98	-13.00	-25.38

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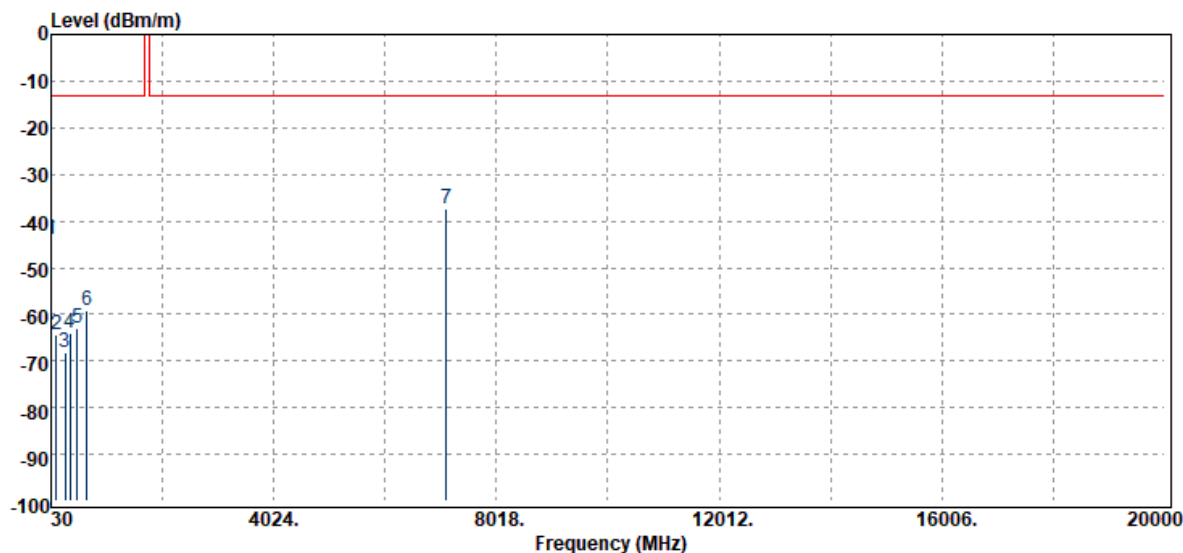
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Radiated Spurious Emission Measurement Result: NB_IOT-Band 66 (The Worst Case)

Report Number : T190624W03
Operation Mode : NB_IOT B66 3.75kHz BPSK 1 0
Test Mode : Tx CH Mid
EUT Pol : H Plane
Test Channel : 132671_1779.9 MHz

Test Date : 2019-07-04
Temp./Humi. : 26/62
Antenna Pol. : VERTICAL
Engineer : Jerry



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
30.00	-44.01	-13.46	-30.10	-0.45	-13.00	-31.01
128.94	-64.25	-53.21	-10.11	-0.93	-13.00	-51.25
288.99	-68.23	-64.59	-2.24	-1.40	-13.00	-55.23
376.29	-63.97	-60.71	-1.65	-1.61	-13.00	-50.97
503.36	-63.02	-59.21	-1.93	-1.88	-13.00	-50.02
672.14	-59.25	-55.70	-1.36	-2.19	-13.00	-46.25
7119.60	-37.32	-40.10	10.76	-7.98	-13.00	-24.32

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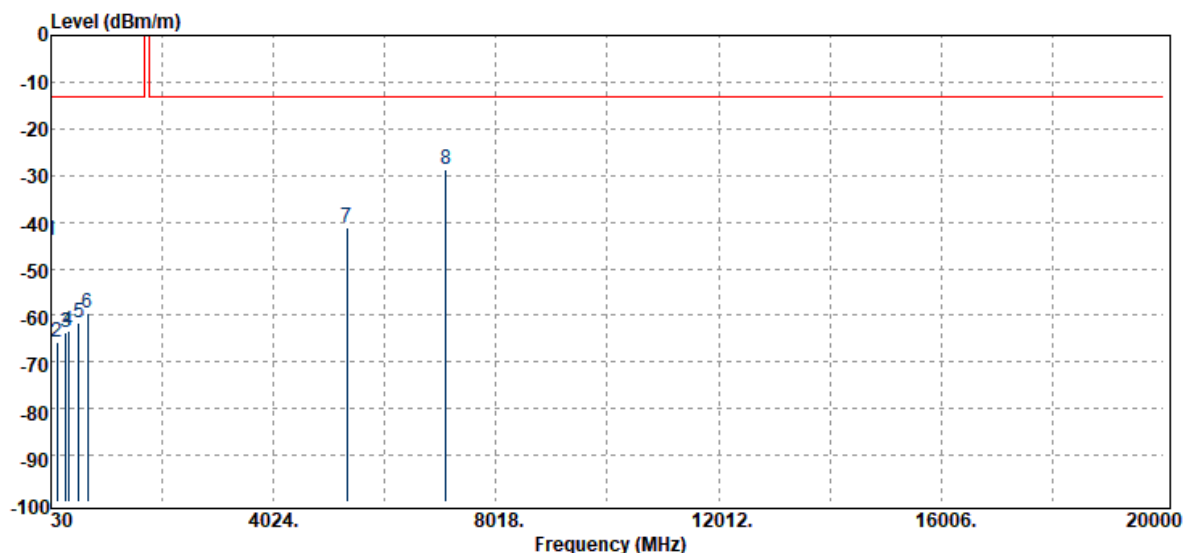
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Report Number : T190624W03
Operation Mode : NB_IOT B66 3.75kHz BPSK 1 0
Test Mode : Tx CH Mid
EUT Pol : H Plane
Test Channel : 132671_1779.9 MHz

Test Date : 2019-07-04
Temp./Humi. : 26/62
Antenna Pol. : HORIZONTAL
Engineer : Jerry



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
30.00	-44.10	-13.55	-30.10	-0.45	-13.00	-31.10
143.49	-65.80	-56.82	-8.00	-0.98	-13.00	-52.80
291.90	-63.79	-60.22	-2.16	-1.41	-13.00	-50.79
338.46	-63.48	-60.43	-1.53	-1.52	-13.00	-50.48
522.76	-61.55	-58.30	-1.34	-1.91	-13.00	-48.55
686.69	-59.53	-55.99	-1.33	-2.21	-13.00	-46.53
5339.70	-41.19	-47.58	13.28	-6.89	-13.00	-28.19
7119.60	-28.55	-31.33	10.76	-7.98	-13.00	-15.55

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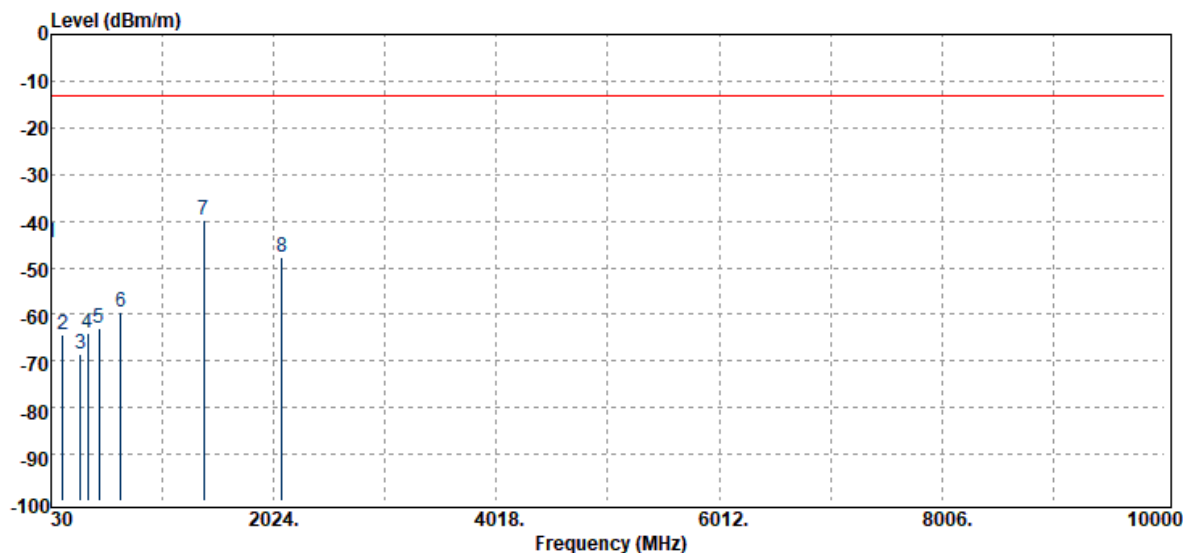
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Radiated Spurious Emission Measurement Result: NB_IOT-Band 71 (The Worst Case)

Report Number : T190624W03
Operation Mode : NB_IOT B71 3.75kHz BPSK 1 0
Test Mode : Tx CH High
EUT Pol : H Plane
Test Channel : 133471_697.9 MHz

Test Date : 2019-07-04
Temp./Humi. : 26/62
Antenna Pol. : VERTICAL
Engineer : Jerry



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
30.00	-44.54	-13.99	-30.10	-0.45	-13.00	-31.54
134.76	-64.46	-54.16	-9.35	-0.95	-13.00	-51.46
291.90	-68.51	-64.94	-2.16	-1.41	-13.00	-55.51
359.80	-64.00	-60.65	-1.78	-1.57	-13.00	-51.00
458.74	-62.96	-59.08	-2.10	-1.78	-13.00	-49.96
657.59	-59.50	-55.84	-1.50	-2.16	-13.00	-46.50
1395.80	-39.68	-36.45	0.00	-3.23	-13.00	-26.68
2093.70	-47.78	-43.69	0.00	-4.09	-13.00	-34.78

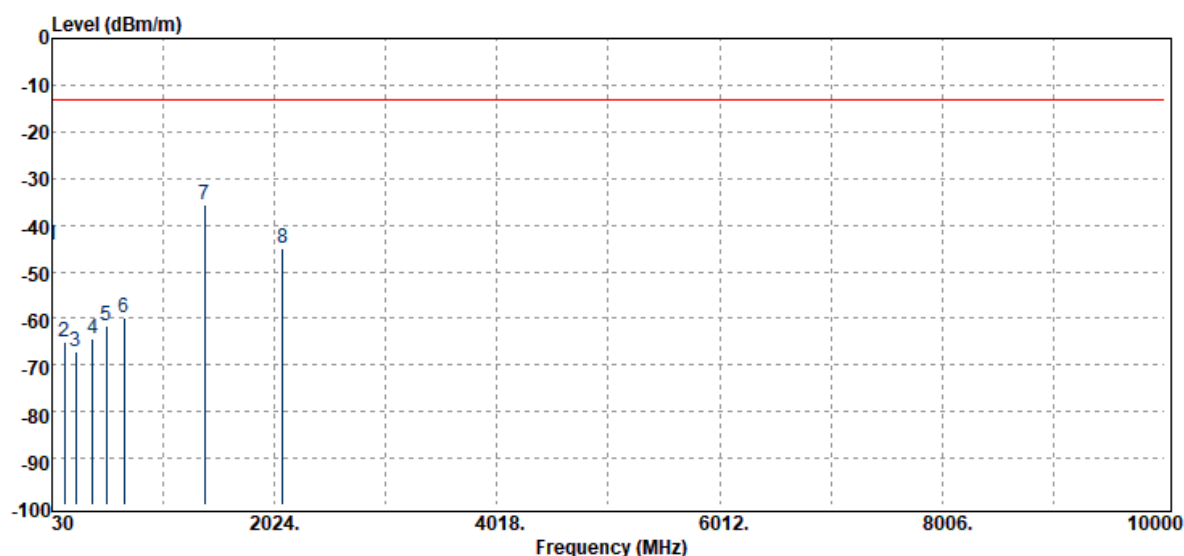
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Report Number : T190624W03
Operation Mode : NB_IOT B71 3.75kHz BPSK 1 0
Test Mode :Tx CH High
EUT Pol : H Plane
Test Channel : 133471_697.9 MHz

Test Date :2019-07-04
Temp./Humi. : 26/62
Antenna Pol. :HORIZONTAL
Engineer : Jerry



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
30.00	-44.21	-13.66	-30.10	-0.45	-13.00	-31.21
141.55	-65.07	-55.79	-8.30	-0.98	-13.00	-52.07
243.40	-67.06	-63.82	-1.96	-1.28	-13.00	-54.06
396.66	-64.37	-61.09	-1.63	-1.65	-13.00	-51.37
516.94	-61.74	-58.38	-1.46	-1.90	-13.00	-48.74
673.11	-60.03	-56.50	-1.34	-2.19	-13.00	-47.03
1395.80	-35.66	-40.40	7.97	-3.23	-13.00	-22.66
2093.70	-44.98	-50.73	9.84	-4.09	-13.00	-31.98

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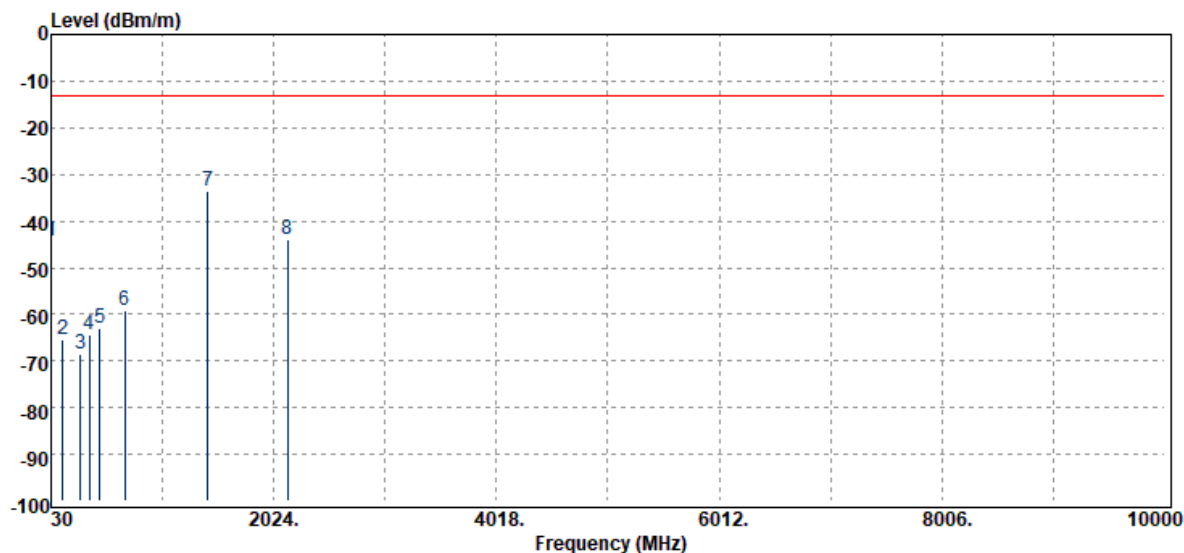
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Radiated Spurious Emission Measurement Result: NB_IOT-Band 85 (The Worst Case)

Report Number : T190624W03
Operation Mode : NB_IOT B85 3.75kHz BPSK 1 0
Test Mode : Tx CH High
EUT Pol : H Plane
Test Channel : 134180_715.9 MHz

Test Date : 2019-07-04
Temp./Humi. : 26/62
Antenna Pol. : VERTICAL
Engineer : Jerry



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
30.00	-44.41	0.00	-30.10	-0.45	-13.00	-31.41
133.79	-65.45	0.00	-9.52	-0.95	-13.00	-52.45
294.81	-68.49	0.00	-2.10	-1.42	-13.00	-55.49
374.35	-64.30	0.00	-1.71	-1.60	-13.00	-51.30
466.50	-62.98	0.00	-2.33	-1.79	-13.00	-49.98
689.60	-59.21	0.00	-1.39	-2.21	-13.00	-46.21
1431.80	-33.69	0.00	8.19	-3.28	-13.00	-20.69
2147.70	-43.78	0.00	9.42	-4.15	-13.00	-30.78

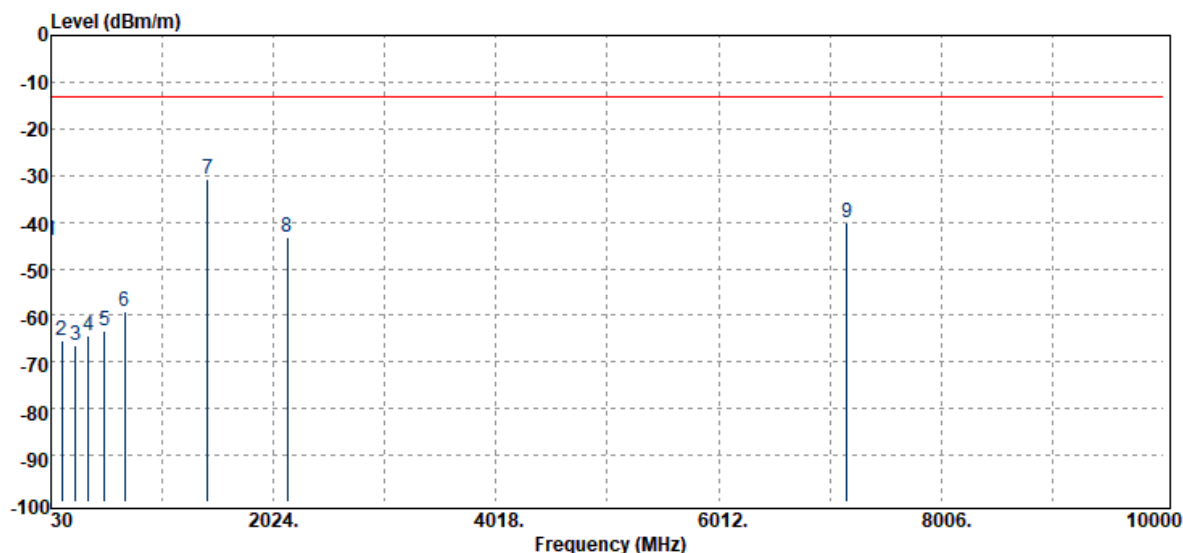
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Report Number : T190624W03
Operation Mode : NB_IOT B85 3.75kHz BPSK 1 0
Test Mode : Tx CH High
EUT Pol : H Plane
Test Channel : 134180_715.9 MHz

Test Date : 2019-07-04
Temp./Humi. : 26/62
Antenna Pol. : HORIZONTAL
Engineer : Jerry



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
30.00	-44.04	0.00	-30.10	-0.45	-13.00	-31.04
128.94	-65.50	0.00	-10.11	-0.93	-13.00	-52.50
251.16	-66.40	0.00	-1.75	-1.30	-13.00	-53.40
367.56	-64.20	0.00	-1.80	-1.59	-13.00	-51.20
507.24	-63.28	0.00	-1.81	-1.89	-13.00	-50.28
691.54	-59.33	0.00	-1.40	-2.22	-13.00	-46.33
1431.80	-30.81	0.00	8.19	-3.28	-13.00	-17.81
2147.70	-43.39	0.00	9.42	-4.15	-13.00	-30.39
7159.00	-40.29	0.00	10.72	-7.99	-13.00	-27.29

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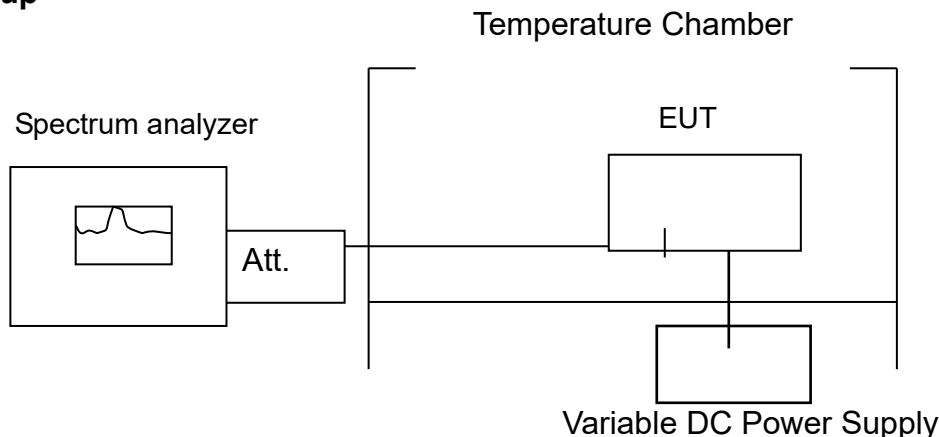
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10 FREQUENCY STABILITY MEASUREMENT

10.1 Standard Applicabl

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

10.2 Test Set-up



Note: Measurement setup for testing on Antenna connector

10.3 Measurement Procedure

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.

Set chamber temperature to 25°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency. Reduce the input voltage to specify extreme voltage variation (+/- 15%) and endpoint as declared by the manufacturer, record the maximum frequency change.

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10.4 Measurement Equipment Used

Conducted Emission (measured at antenna port) Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
PXA Spectrum Analyzer	Agilent	N9030A	MY53120760	04/22/2019	04/21/2020
DC Power Supply	Agilent	E3640A	MY40000811	12/11/2018	12/10/2019
Radio Communication Analyzer	Anritsu	MT8821C	6261786084	01/09/2019	01/08/2020
Temperature Chamber	TERCHY	MHG-120LF	911009	05/17/2019	05/16/2020
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2019	01/01/2020
Splitter	RF-LAMBAD	RFLT2W1G18G	11-JSPF412-018	01/02/2019	01/01/2020
Coaxial Cables	N/A	WK CE Cable	N/A	01/02/2019	01/01/2020

10.5 Measurement Result

LTE NB IoT Band 2 1880 MHz				
Limit: within frequency block				
Vdc	Temp. (°C)	Freq. (MHz)	Delta (Hz)	Frequency error
FREQUENCY ERROR vs. VOLTAGE				
5.75	20	1880	0	0.000
5	20	1880.00008	80	0.043
4.25	20	1880.00007	70	0.037
2.4(End point)	20	1879.99994	60	-0.032
FREQUENCY ERROR vs. Temp.				
5	50	1879.99993	70	-0.037
5	40	1880.00000	0	0.000
5	30	1880.00007	70	0.037
5	20	1879.99994	60	-0.032
5	10	1879.99992	80	-0.043
5	0	1879.99998	20	-0.011
5	-10	1879.99994	60	-0.032
5	-20	1880.00000	0	0.000
5	-30	1880.00006	60	0.032

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LTE NB IoT Band 4 1733 MHz				
Limit: within frequency block				
Vdc	Temp. (°C)	Freq. (MHz)	Delta (Hz)	Frequency error
FREQUENCY ERROR vs. VOLTAGE				
5.75	20	1732.50003	30	0.017
5	20	1732.5	0	0.000
4.25	20	1732.49994	60	-0.035
2.4(End point)	20	1732.50004	40	0.023
FREQUENCY ERROR vs. Temp.				
5	50	1732.50004	40	0.023
5	40	1732.50005	50	0.029
5	30	1732.49993	70	-0.040
5	20	1732.50005	50	0.029
5	10	1732.50003	30	0.017
5	0	1732.50005	50	0.029
5	-10	1732.50005	50	0.029
5	-20	1732.49998	20	-0.012
5	-30	1732.49996	40	-0.023

LTE NB IoT Band 5 888 MHz				
Limit: +/- 2.5 ppm				
Vdc	Temp. (°C)	Freq. (MHz)	Delta (Hz)	Frequency error
FREQUENCY ERROR vs. VOLTAGE				
5.75	20	888.00004	40	0.045
5	20	888	0	0.045
4.25	20	888.00003	30	0.045
2.4(End point)	20	887.99996	40	0.045
FREQUENCY ERROR vs. Temp.				
5	50	888.00003	30	0.034
5	40	887.99993	70	-0.079
5	30	887.99996	40	-0.045
5	20	888.00006	60	0.068
5	10	887.99996	40	-0.045
5	0	888.00006	60	0.068
5	-10	887.99998	20	-0.023
5	-20	887.99992	80	-0.090
5	-30	888.00000	0	0.000

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LTE NB IoT Band 12 708 MHz				
Limit: within frequency block				
Vdc	Temp. (°C)	Freq. (MHz)	Delta (Hz)	Frequency error
FREQUENCY ERROR vs. VOLTAGE				
5.75	20	707.50001	10	0.014
5	20	707.49995	50	-0.071
4.25	20	707.50002	20	0.028
2.4(End point)	20	707.50002	20	0.028
FREQUENCY ERROR vs. Temp.				
5	50	707.50006	60	0.085
5	40	707.50002	20	0.028
5	30	707.50000	0	0.000
5	20	707.49995	50	-0.071
5	10	707.50006	60	0.085
5	0	707.50001	10	0.014
5	-10	707.49994	60	-0.085
5	-20	707.50008	80	0.113
5	-30	707.50007	70	0.099

LTE NB IoT Band 13 782 MHz				
Limit: within frequency block				
Vdc	Temp. (°C)	Freq. (MHz)	Delta (Hz)	Frequency error
FREQUENCY ERROR vs. VOLTAGE				
5.75	20	782.00002	20	0.026
5	20	782.00001	10	0.013
4.25	20	782.00006	60	0.077
2.4(End point)	20	782.00005	50	0.064
FREQUENCY ERROR vs. Temp.				
5	50	782.00002	20	0.026
5	40	781.99995	50	-0.064
5	30	782.00001	10	0.013
5	20	782.00000	0	0.000
5	10	781.99992	80	-0.102
5	0	781.99994	60	-0.077
5	-10	782.00003	30	0.038
5	-20	782.00005	50	0.064
5	-30	781.99994	60	-0.077

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LTE NB IoT Band 17 710 MHz				
Limit: within frequency block				
Vdc	Temp. (°C)	Freq. (MHz)	Delta (Hz)	Frequency error
FREQUENCY ERROR vs. VOLTAGE				
5.75	20	709.99994	60	-0.085
5	20	709.99996	40	-0.056
4.25	20	710.00004	40	0.056
2.4(End point)	20	709.99997	30	-0.042
FREQUENCY ERROR vs. Temp.				
5	50	709.99999	10	-0.014
5	40	710.00002	20	0.028
5	30	710.00003	30	0.042
5	20	710.00000	0	0.000
5	10	710.00000	0	0.000
5	0	710.00005	50	0.070
5	-10	710.00003	30	0.042
5	-20	710.00006	60	0.085
5	-30	709.99999	10	-0.014

LTE NB IoT Band 66 1745 MHz				
Limit: within frequency block				
Vdc	Temp. (°C)	Freq. (MHz)	Delta (Hz)	Frequency error
FREQUENCY ERROR vs. VOLTAGE				
5.75	20	1744.99993	70	-0.040
5	20	1744.99993	70	-0.040
4.25	20	1745.00002	20	0.011
2.4(End point)	20	1745	0	0.000
FREQUENCY ERROR vs. Temp.				
5	50	1745.00004	40	0.023
5	40	1745.00002	20	0.011
5	30	1744.99998	20	-0.011
5	20	1744.99993	70	-0.040
5	10	1744.99997	30	-0.017
5	0	1745.00003	30	0.017
5	-10	1745.00005	50	0.029
5	-20	1744.99993	70	-0.040
5	-30	1745.00004	40	0.023

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LTE NB IoT Band 71 681 MHz				
Limit: within frequency block				
Vdc	Temp. (°C)	Freq. (MHz)	Delta (Hz)	Frequency error
FREQUENCY ERROR vs. VOLTAGE				
5.75	20	680.5	0	0.000
5	20	680.49997	30	-0.044
4.25	20	680.49995	50	-0.073
2.4(End point)	20	680.49995	50	-0.073
FREQUENCY ERROR vs. Temp.				
5	50	680.50004	40	0.059
5	40	680.50000	0	0.000
5	30	680.50006	60	0.088
5	20	680.50003	30	0.044
5	10	680.49992	80	-0.118
5	0	680.50003	30	0.044
5	-10	680.49992	80	-0.118
5	-20	680.49995	50	-0.073
5	-30	680.50001	10	0.015

LTE NB IoT Band 85 707 MHz				
Limit: within frequency block				
Vdc	Temp. (°C)	Freq. (MHz)	Delta (Hz)	Frequency error
FREQUENCY ERROR vs. VOLTAGE				
5.75	20	707.00007	70	0.099
5	20	706.99995	50	-0.071
4.25	20	706.99995	50	-0.071
2.4(End point)	20	706.99992	80	-0.113
FREQUENCY ERROR vs. Temp.				
5	50	706.99992	80	-0.113
5	40	706.99996	40	-0.057
5	30	706.99997	30	-0.042
5	20	707.00001	10	0.014
5	10	707.00007	70	0.099
5	0	706.99998	20	-0.028
5	-10	707.00004	40	0.057
5	-20	707.00000	0	0.000
5	-30	707.00003	30	0.042

Note: The battery is rated 5Vdc.

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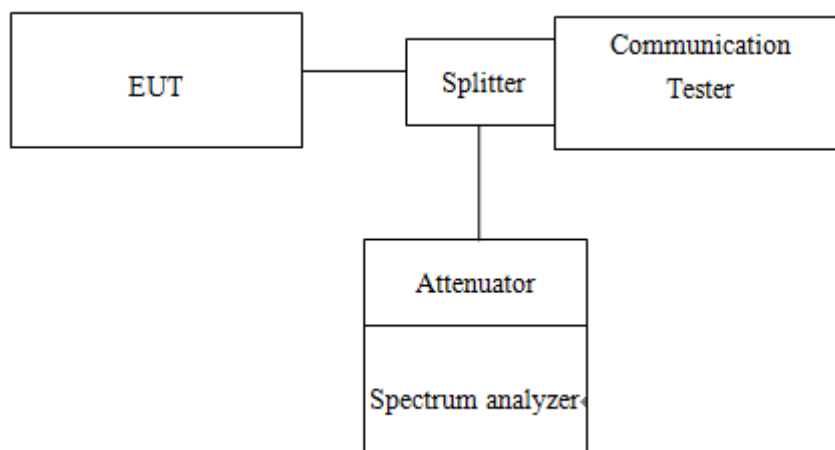
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11 PEAK TO AVERAGE RATIO

11.1 Standard Applicable

The peak-to-average ratio (PAR) of the transmission may not exceed 13dB.

11.2 Test SET-UP



11.3 Measurement Procedure

1. KDB 971168 D01 is employed as the following procedure is proper adjusted accordingly:
2. Set resolution/measurement bandwidth $\geq$ signal's occupied bandwidth; & internal = 1ms
3. Set the number of counts to a value that stabilizes the measured CCDF curve.

11.4 Measurement Equipment Used

Conducted Emission (measured at antenna port) Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
PXA Spectrum Analyzer	Agilent	N9030A	MY53120760	04/22/2019	04/21/2020
DC Power Supply	Agilent	E3640A	MY40000811	12/11/2018	12/10/2019
Radio Communication Analyzer	Anritsu	MT8821C	6261786084	01/09/2019	01/08/2020
Temperature Chamber	TERCHY	MHG-120LF	911009	05/17/2019	05/16/2020
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2019	01/01/2020
Splitter	RF-LAMBAD	RFLT2W1G18G	11-JSPF412-018	01/02/2019	01/01/2020
Coaxial Cables	N/A	WK CE Cable	N/A	01/02/2019	01/01/2020

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11.5 Measurement Result

Tabular Results:

LTE NB-IoT Band 2					
Channel	Freq. (MHz)	Modulation	Subcarrier Spacing (kHz)	N _{tones}	Peak-to-Average Power Ratio(dB)
18601	1850.1	BPSK	15	1@0	9.06
		QPSK	15	12@0	9.38
18900	1880	BPSK	15	1@0	9.53
		QPSK	15	12@0	11.72
19199	1909.9	BPSK	15	1@0	8.72
		QPSK	15	12@0	11.47

LTE NB-IoT Band 4					
Channel	Freq. (MHz)	Modulation	Subcarrier Spacing (kHz)	N _{tones}	Peak-to-Average Power Ratio(dB)
19951	1710.1	BPSK	15	1@0	8.02
		QPSK	15	12@0	12.55
20175	1732.5	BPSK	15	1@0	9.07
		QPSK	15	12@0	10.8
20399	1754.9	BPSK	15	1@0	7.36
		QPSK	15	12@0	11.68

LTE NB-IoT Band 5					
Channel	Freq. (MHz)	Modulation	Subcarrier Spacing (kHz)	N _{tones}	Peak-to-Average Power Ratio(dB)
20401	824.1	BPSK	15	1@0	11.64
		QPSK	15	12@0	7.56
20525	836.5	BPSK	15	1@0	12.02
		QPSK	15	12@0	9.84
20649	848.9	BPSK	15	1@0	10.36
		QPSK	15	12@0	10.18

LTE NB-IoT Band 12					
Channel	Freq. (MHz)	Modulation	Subcarrier Spacing (kHz)	N _{tones}	Peak-to-Average Power Ratio(dB)
23011	699.1	BPSK	15	1@0	8.24
		QPSK	15	12@0	7.14
23095	707.5	BPSK	15	1@0	8.11
		QPSK	15	12@0	9.33
23719	715.9	BPSK	15	1@0	11.61
		QPSK	15	12@0	8.11

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LTE NB-IoT Band 13					
Channel	Freq. (MHz)	Modulation	Subcarrier Spacing (kHz)	N _{tones}	Peak-to-Average Power Ratio(dB)
23181	777.1	BPSK	15	1@0	8.12
		QPSK	15	12@0	9.96
23230	782	BPSK	15	1@0	8
		QPSK	15	12@0	9.92
23279	786.9	BPSK	15	1@0	9.08
		QPSK	15	12@0	9.31

LTE NB-IoT Band 17					
Channel	Freq. (MHz)	Modulation	Subcarrier Spacing (kHz)	N _{tones}	Peak-to-Average Power Ratio(dB)
23731	704.1	BPSK	15	1@0	8.46
		QPSK	15	12@0	10.06
23790	710	BPSK	15	1@0	7.68
		QPSK	15	12@0	8.71
23849	715.9	BPSK	15	1@0	7.7
		QPSK	15	12@0	9.2

LTE NB-IoT Band 66					
Channel	Freq. (MHz)	Modulation	Subcarrier Spacing (kHz)	N _{tones}	Peak-to-Average Power Ratio(dB)
131973	1710.1	BPSK	15	1@0	10.05
		QPSK	15	12@0	11.2
132322	1745	BPSK	15	1@0	10.02
		QPSK	15	12@0	12.75
132671	1779.9	BPSK	15	1@0	10.28
		QPSK	15	12@0	11.03

LTE NB-IoT Band 71					
Channel	Freq. (MHz)	Modulation	Subcarrier Spacing (kHz)	N _{tones}	Peak-to-Average Power Ratio(dB)
133123	663.1	BPSK	15	1@0	7.78
		QPSK	15	12@0	8.66
133297	680.5	BPSK	15	1@0	9.74
		QPSK	15	12@0	12.2
133471	697.9	BPSK	15	1@0	8.44
		QPSK	15	12@0	12.16

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LTE NB-IoT Band 85					
Channel	Freq. (MHz)	Modulation	Subcarrier Spacing (kHz)	N _{tones}	Peak-to-Average Power Ratio(dB)
134003	698.1	BPSK	15	1@0	10.28
		QPSK	15	12@0	11.18
134092	707	BPSK	15	1@0	8.75
		QPSK	15	12@0	9.98
134181	715.9	BPSK	15	1@0	7.74
		QPSK	15	12@0	11.3

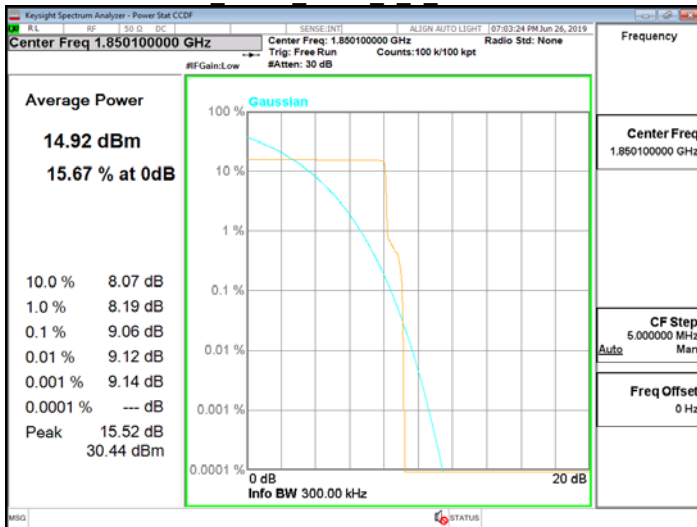
Please refer to next page for test plots.

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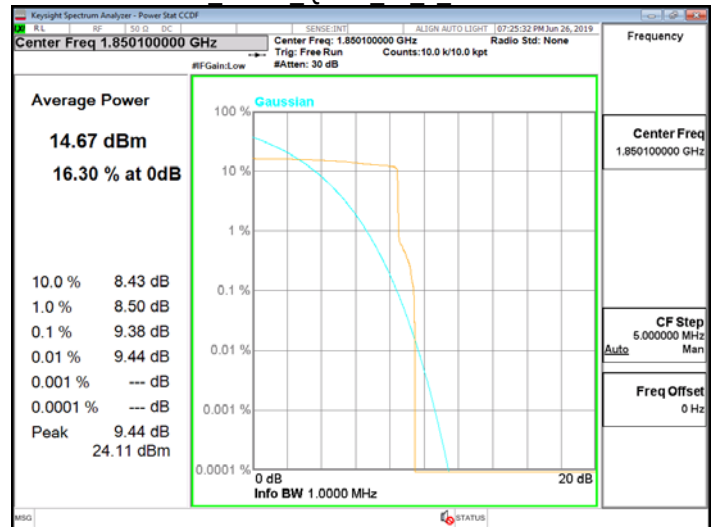
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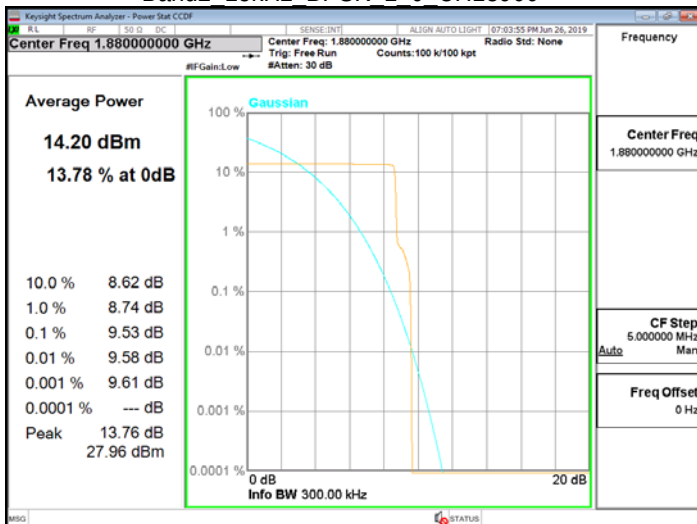
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Band2 15kHz QPSK 12 0 CH18601



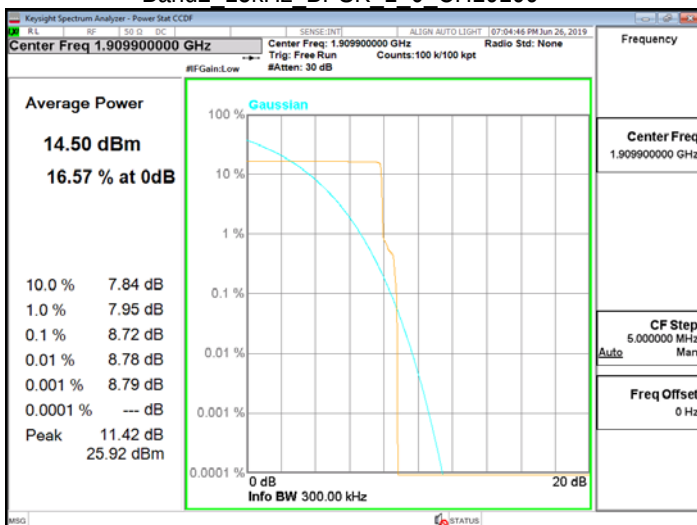
Band2 15kHz BPSK 1 0 CH18900



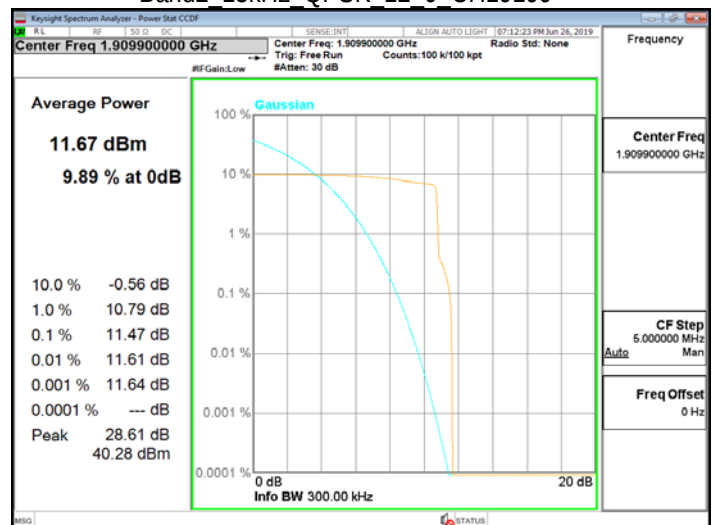
Band2 15kHz QPSK 12 0 CH18900



Band2 15kHz BPSK 1 0 CH19199



Band2 15kHz QPSK 12 0 CH19199

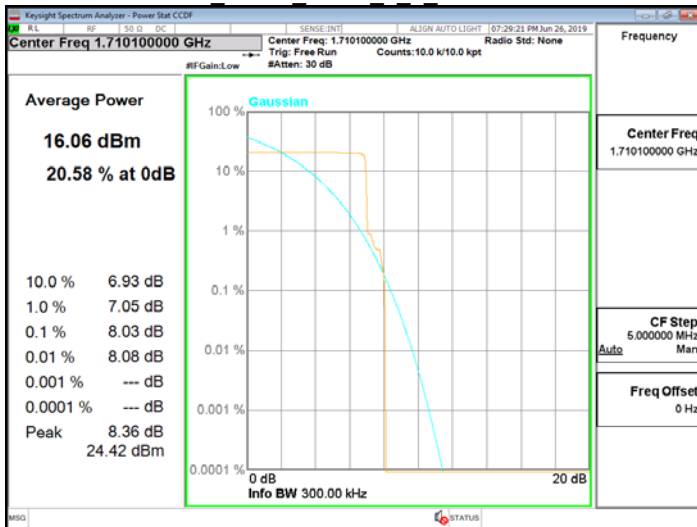


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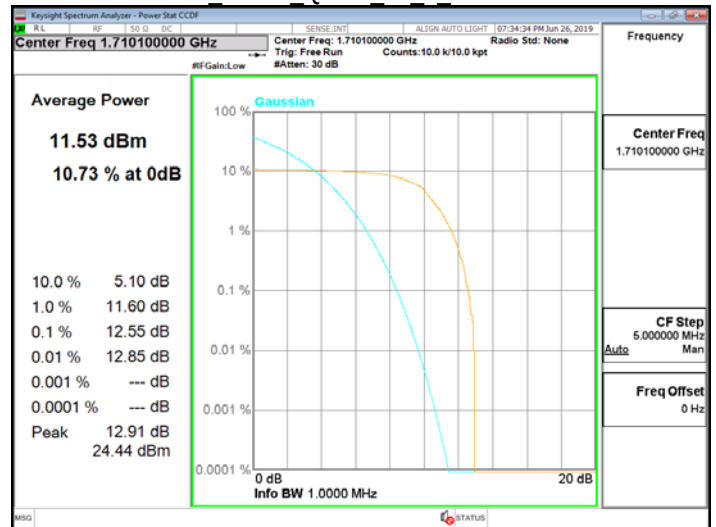
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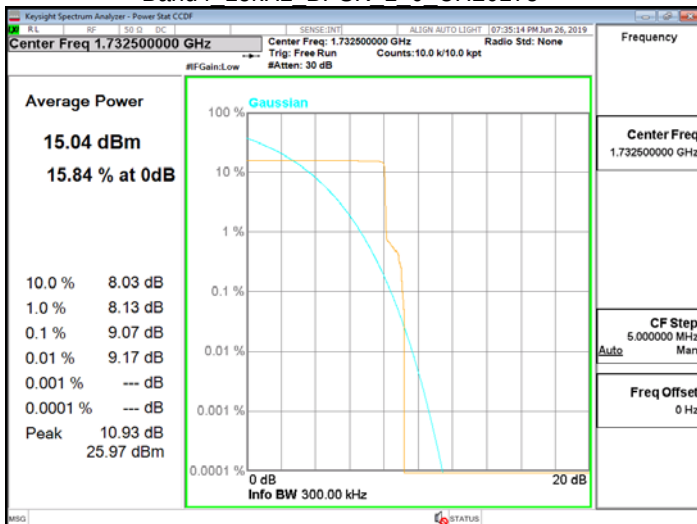
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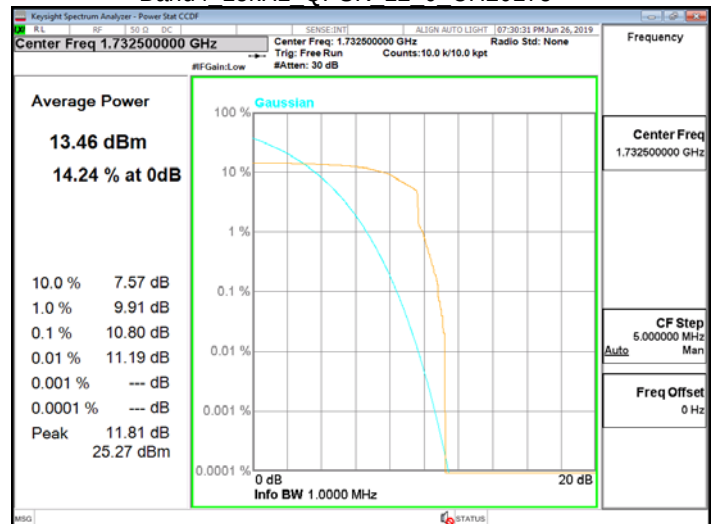
Band4 15kHz QPSK 12 0 CH19951



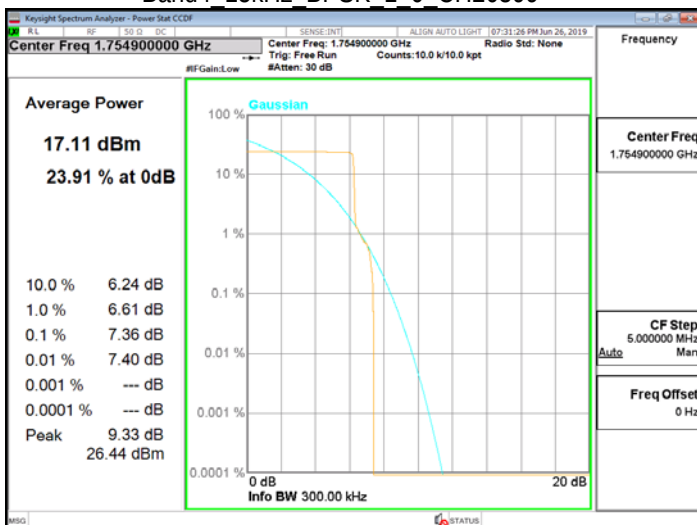
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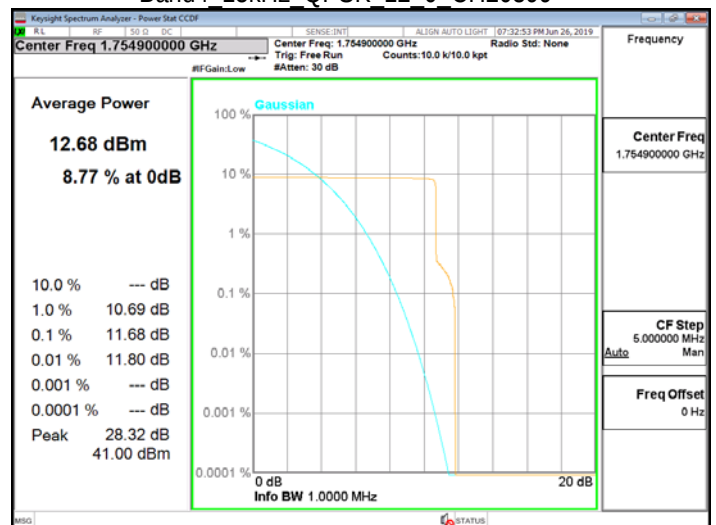
Band4 15kHz QPSK 12 0 CH20175



Band4 15kHz BPSK 1 0 CH20399



Band4 15kHz QPSK 12 0 CH20399

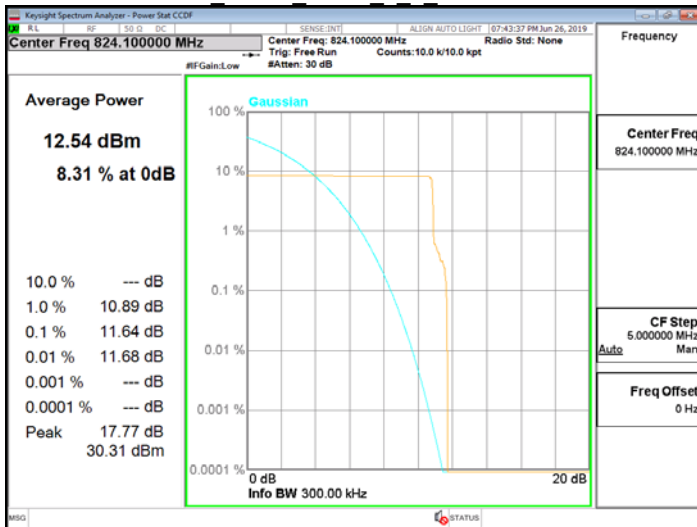


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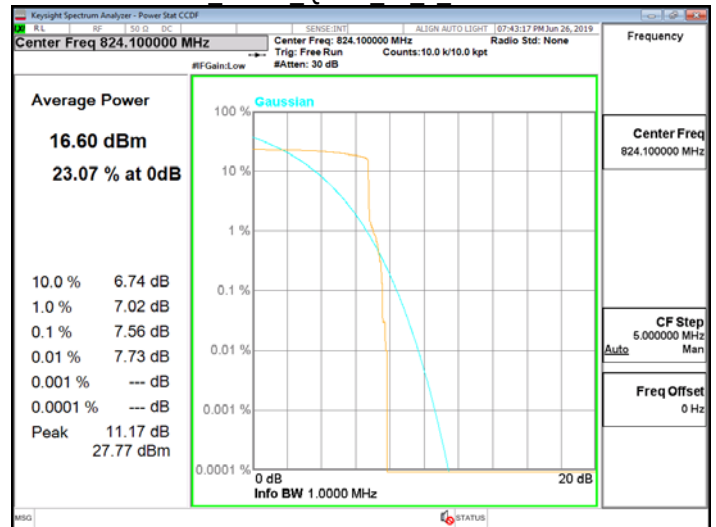
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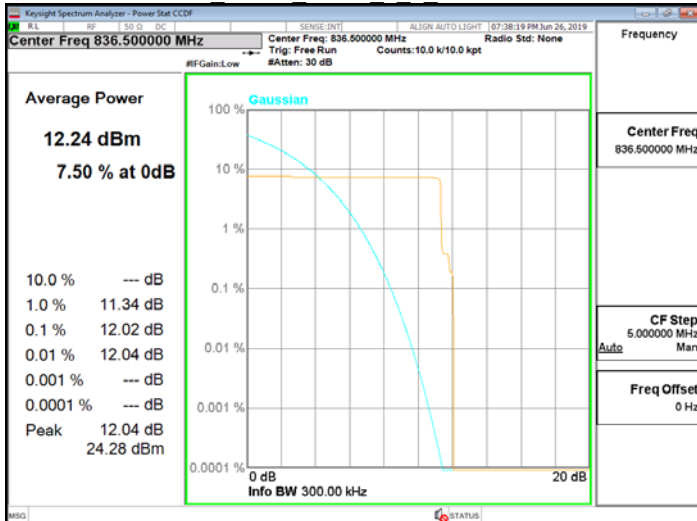
Band5 15kHz BPSK 1 0 CH20401



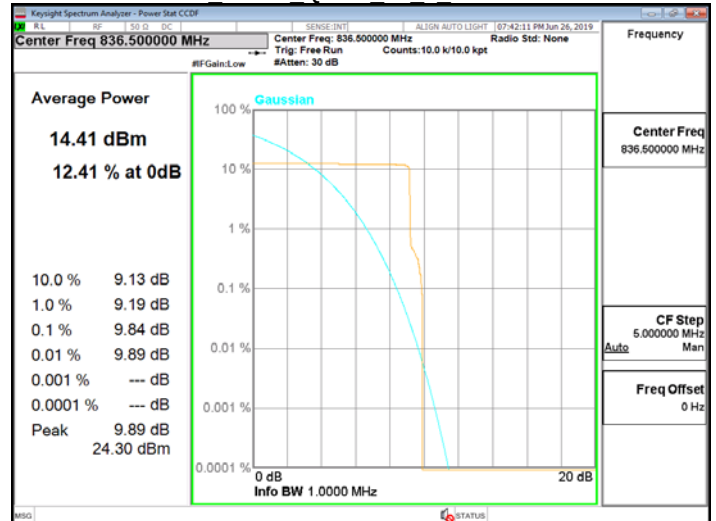
Band5 15kHz QPSK 12 0 CH20401



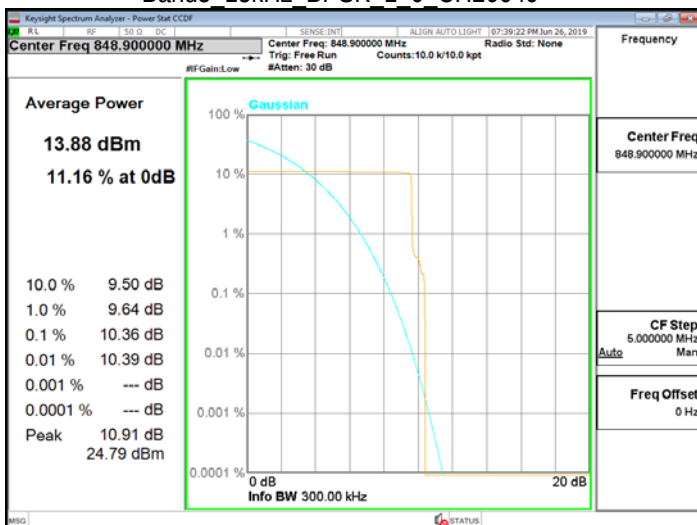
Band5 15kHz BPSK 1 0 CH20525



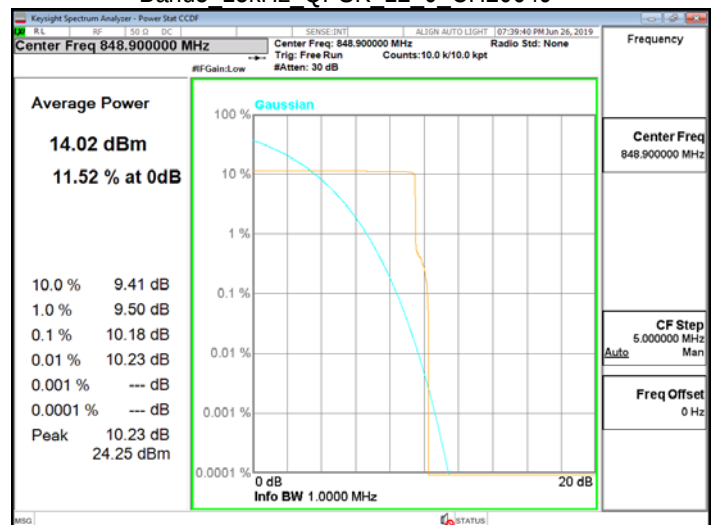
Band5 15kHz QPSK 12 0 CH20525



Band5 15kHz BPSK 1 0 CH20649



Band5 15kHz QPSK 12 0 CH20649



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